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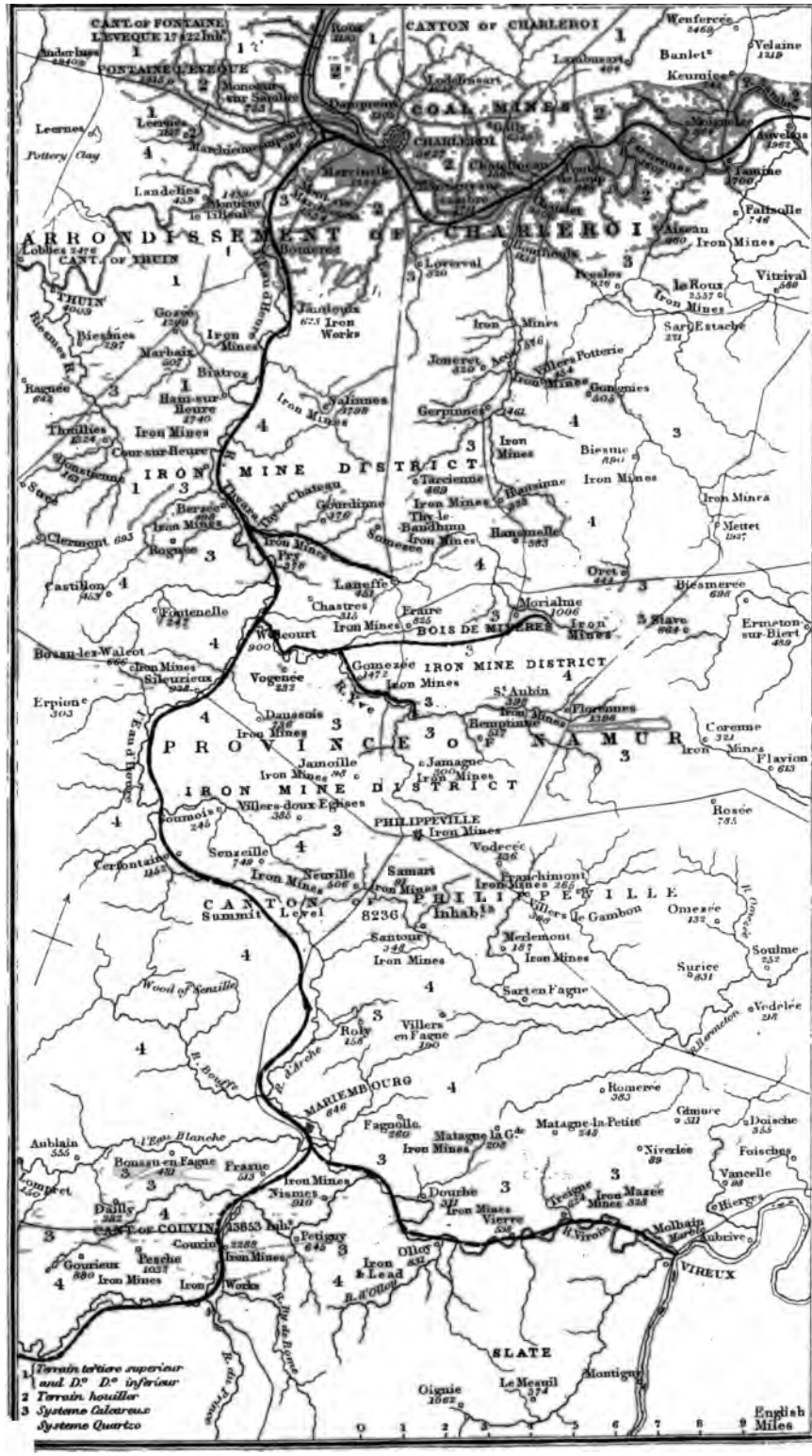

PLAN [illegible] RAILWAY.

SAMBRE AND MEUSE RAILWAY.

GRANT

FROM

THE BELGIAN GOVERNMENT,

REPORT OF MR. STEPHENSON,

AND

General Statement.

MAY, 1845.

LONDON:
PRINTED BY
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MDCCCXLV.

Transport.

SAMBRE AND MEUSE RAILWAY.

Directors.

W. P. RICHARDS, CHAIRMAN.
W. G. HAYTER, M.P. DEPUTY CHAIRMAN.
JOHN ANDERSON,
WILLIAM BETTS.
J. P. FEARON.
THOMSON HANKEY, JUNIOR.
TERCELIN SIGART.

Bankers.

MESSRS. HANKEY AND CO.

OFFICE.—61, MOORGATE STREET.

CONTENTS.

SAMBRE AND MEUSE RAILWAY.

1845.

THE Directors have published the general state of their proceedings down to March last.

The law authorising the construction of this Railway passed the Belgian Chamber on the 7th of March, 1845. By this law, the Belgian Government was empowered, under certain conditions, to make a Grant of the Railway and Branches to the Company.

The Convention between the Government and the Company bears date the Twenty-seventh of the same month, and it was ratified by the King on the Twenty-eighth.

The following is a translation of the Official Document.

SAMBRE AND MEUSE RAILWAY.

GRANT.

LEOPOLD KING OF THE BELGIANS,

To all present and to come, greeting:

Whereas by a law of the 7th of March instant, the Government was authorised to give to Messrs. Richards and Company, with certain reservations therein stipulated, the Grant of the Sambre and Meuse Railway and the Branches thereof, upon the basis of the Conventions of the 26th June, 1844, and the 1st February, 1845: and

Whereas by a Convention signed on the 27th instant, between our Minister of Public Works of the one part, and Messrs. Richards and Company of the other part, the conditions of the Grant are definitively settled and made conformable to the law of the 7th of March of this present year:

Upon the proposition of our Minister of Public Works, We have decreed and do decree, that

Messrs. Richards and Company are declared the Grantees of the Sambre and Meuse Railway and its Branches, upon the terms of the Convention of the 27th March,

1845, hereinbefore mentioned; which Convention shall be annexed to the present Decree.

Our Minister of Public Works is charged with the execution of the present Decree.

Given at Laeken, the 28th day of March, 1845.

LEOPOLD.

By the King.

The Minister of Public Works,

A. Dechamps.

Convention.

Between William Parry Richards, merchant, William Goodenough Hayter, M. P., Thomson Hankey, junior, merchant, John Peter Fearon, gentleman, all of London, and Tercelin Sigart, of Mons, banker, of the one part;

And the Belgian Government, represented by the Minister of Public Works, of the other part.

The aforesaid contracting parties whose names are hereunto affixed, having duly considered,

1st, The law passed on the 7th day of March, by which the Government was authorised to give to Messrs. Richards and Co., with certain reservations therein mentioned, the Grant of the Sambre and Meuse Railway and its Branches, upon the basis laid down in the Conventions of the 26th June, 1844, and 1st February, 1845, between the Minister of Public Works and this Company.

2nd, The aforesaid Conventions of the 26th June, 1844, and the 1st February, 1845;

3rd, The "Cahier des charges" or conditions annexed to the first named convention; and,

4th, The reservations mentioned in the law of the 7th of March instant, with respect to certain modifications to

be made in the articles 39, 40 and 41 of the aforesaid "Cahier des charges;"

Have agreed to substitute for the original "Cahier des charges" or conditions, as well as for the provisional Conventions of the 26th of June, 1844, and the 1st of February, 1845, a new Convention, finally determining the conditions of the Grant, and rendering the same conformable to the law of the 7th of March of the present year.

The tenor of which Convention is as follows:

SAMBRE AND MEUSE RAILWAY.

General Direction of the Line.

Art. 1. The Sambre and Meuse Railway comprises the Main Line, with a curve leading towards Charleroi, and the Branches hereinafter described.

The Main Line joins the Government Railway from Brussels to Namur, at a point near the station of Marchienne au Pont. It is connected by a curve with the station at Charleroi.

From Marchienne au Pont the Main Line ascends the valley of the Eau d'Heure as far as the summit level which divides the basins of the Rivers Sambre and Meuse, passing near the villages of Jamioulx, Ham-sur-Heure, Cour-sur-Heure, Berzée, Walcourt, Silenrieux, Cerfontaine and Senzeille, and the iron works of Zône, Bommerée, Biatroz, Hameau, Thy-le-Château, Jardinet, Batte-Fer, Feronval and Falemprise. From the summit level the Line descends to Mariembourg; passing the iron works of Roly, a short distance to the left from Mariembourg, it descends the valleys of the Eau Blanche and the Viroin as far as the French frontier, at less than two kilometres from Vireux-sur-Meuse. Beyond Mariembourg it passes near the iron

works of Nismes and the villages of Dourbes, Olloy, Vierve, Treigne and Mazée.

The Main Line crosses the high roads leading from Charleroi to Chimay, from Dinant to Maubeuge, and from Charleroi to Rocroi.

The first Branch commences at Berzée, passes close to the iron works of Thy-le-Château, and terminates at the high road from Charleroi to Rocroi, near the village and iron works of Laneffe.

The second Branch commences at Walcourt and terminates beyond the village of Morialmé, passing near those of Vogenée and Fraire and the iron works of Rossignol, Fairoul, Hanzinelle and Morialmé. It crosses the iron mines of Fraires and Morialmé and the high roads from Charleroi to Rocroi. This Branch has two self-acting inclines.

The third Branch diverges from the second at Fairoul, passes near the iron works of Yves-Gomezée and St. Lambert, and terminates at those of Froidmont. This Branch crosses the high road from Charleroi to Rocroi.

The fourth Branch commences at Mariembourg and terminates at the iron works of Couvin, near the high road from Charleroi to Rocroi and that from Couvin to Mons.

The Main Line and the four Branches, of which the general direction is hereinbefore described, are laid down on the plans of the Line No. 7. prepared by the Government Engineers. The town of Philippeville shall be connected with the Sambre and Meuse Railway, either by a Branch constructed for that purpose, or by changing the direction of the Main Line at or near Walcourt, at the option of the Company.

In the event of the direction of the Main Line being changed, a Branch between Walcourt and Cerfontaine

must be made by the Company. One of the Branches above described shall, at the option of the Company, be continued as far as Florennes.

"PROJET DEFINITIF."

Art. 2. The Line as finally laid down must not deviate more than 100 metres from the centre of the transverse section or axis of the plan No. 7, excepting at the summit level between Cerfontaine and Mariembourg, where it may deviate 300 metres, and on the Branches from Walcourt to Morialmé, and from Fairoul to Froidmont, where it may deviate 500 metres on account of the self-acting inclines to be made thereon.

SECTION FROM MARCHIENNE TO SILENRIEUX, AND JUNCTION WITH CHARLEROI STATION.

The minimum radius of the curves on this division of the Line is fixed at 500 metres, except those immediately beyond Jamioulx and the forge of Jardinet, where the radii may be reduced to 400 metres, provided that the gradients upon these curves nowhere exceed 0^m 002. The maximum gradient for this division is fixed at 0^m 005.

SECTION FROM SILENRIEUX TO MARIEMBOURG.

The minimum radius of the curves on this division is fixed at 450 metres, the maximum gradient at 0·005, excepting the summit level of Cerfontaine, where the maximum may be increased to 0·006 on the Cerfontaine side of the summit, and to 0·008 on the Mariembourg side.

SECTION FROM MARIEMBOURG TO VIREUX.

The minimum radius of the curves on this division of the line is fixed at 350 metres, and on no part of them

must the gradients exceed 0·0035. The maximum gradient for this division is fixed at 0·005.

BRANCH FROM THY-LE-CHATEAU TO LANEFFE.

The minimum radius of the curves on this Branch is fixed at 45 metres, and the maximum gradient at 0·0055.

BRANCH FROM WALCOURT TO MORIALME.

The radius of the curves on this Branch must not be less than 45 metres. The maximum gradient is fixed at 0·0055, excepting at the fixed inclines, where it may be increased to 0·05.

BRANCH FROM FAIROUL TO FROIDMONT.

The minimum radius of the curves on this Branch is fixed at 45 metres, and the maximum gradient at 0·005.

BRANCH FROM MARIEMBOURG TO COUVIN.

The radius of the curves on this part shall be at least 500 metres, and the gradients shall nowhere exceed 0·005.

Such modifications may be introduced in determining the direction of the Line, the radii of the curves and the gradients, as may be deemed compatible with regularity, speed and safety in working the Line, regard being had to the description and power of the locomotives.

Moreover, in the final plans, &c., the following conditions are required.

The minimum width of the road for a single line of rails must be 4 metres.

The minimum width for a double line of rails must be 8·40 metres.

The minimum weight of the rails, which are to be of rolled iron, is fixed at 18 kilogrammes per metre upon

the Main Line, and on the Branch from Mariembourg to Couvin; upon the other Branches at 14 kilos. per metre. The chairs are to be of cast iron, the sleepers of oak timber, and the Railway ballasted with sand, silicious gravel or scoriæ.

The minimum width of the tunnels and viaducts, measured at 1·60 metres above the rails, is fixed at 4·20 metres.

The minimum height of the same works above the rails at 5 metres.

Art. 3. Within six months from the date hereof, and afterwards at intervals of four months, the grantees shall submit for the approval of the Minister of Public Works, in portions of about one quarter of the entire extent of the Main Line and the four Branches, complete plans of the Railway, consisting of longitudinal and transverse sections, estimates made in conformity with the stipulations of the preceding article, and comprising, moreover, those for the works of art of every description, the self-acting inclines, the detailed estimates for the permanent way, for the level crossings of roads and highways, turning or draw bridges, houses for guards, signal men, &c., sidings and stations, with the buildings and appurtenances, and, in short, for every description of works required to complete the Main Line and Branches, and for the regular working thereof. Nevertheless, the complete plans, &c. of each fourth part of the Railway may be presented in sub-divisions within the period mentioned; provided that each portion comprises an extent of 5000 metres at least.

Art. 4. In preparing their plans, estimates, &c., as required by the terms of Article 3, regard being had to the latitude allowed by Article 2, the grantees shall, as nearly as possible, conform—1st. To the basis laid down by the government engineers in their project No. 7, to effect which they shall receive a copy of the plans, sections, estimates

and other documents relating thereunto; and, 2dly, To the mode adopted for the construction of the national Lines of Railway.

Art. 5. The Minister of Public Works may make such modifications in the plans and proposals presented to him by the grantees as he may consider necessary and useful, to render them as nearly as possible conformable to the plan No. 7; and the grantees are required to adopt such modifications, and shall not, in the execution of the Line, deviate from the plans approved by the minister, without his express authority.

Art. 6. The gauge or width of the Line shall be the same as that of the Government Railways. Both on the Main Line and Branches it is not compulsory to lay more than a single railway.

Art. 7. The iron for the Railway must be of Belgian manufacture; provided it can be furnished at a price not exceeding 10 per cent. that of foreign iron delivered at Antwerp.

Art. 8. The locomotives, carriages and waggons shall be manufactured in Belgium; nevertheless, on account of the improvements which may be made in other countries in locomotives, the grantees shall be allowed to purchase abroad such locomotives as they may require for models.

Art. 9. All the works on the Railway without exception may be constructed with the materials used in executing public works in the same district, upon the sole condition that every description of material used shall be the best of its kind, and that the whole are put together upon scientific principles, in such a manner as to ensure the solidity and durability of the works.

Art. 10. The Railway works of every description shall be completed within four years at the utmost, commencing from the date hereof, so that the main Line, with the

Branch from Mariembourg to Couvin, may be opened thoughout for locomotive travelling, and the three other Branches for horses and the self-acting inclines.

Art. 11. The Branches may be worked by locomotives instead of horses. Locomotives must be used for the passenger traffic on the Philippeville Branch.

Art. 12. As soon as any section of the main Line or of a Branch is ready for opening, the grantees may work it upon being expressly authorised so to do by the Minister of Public Works.

Art. 13. The grantees contract to execute at their own cost and risk, and without any charge whatever to the Government, the works of every kind foreseen or unforeseen, without any exception or distinction ;—to furnish and renew the materials of all kinds necessary for the construction of the Railway of the Sambre and Meuse, its Branches and Dependencies, and also for its working and maintenance. This clause must be considered as forming the basis of the contract; and it is understood between the contracting parties, that it is at all times to receive the most liberal interpretation.

Art. 14. The Railway being declared a work of public utility, any lands required for the execution of the same, whether built upon or otherwise,—those necessary for excavations, the conveyance or deposit of earth and materials for the construction of the Railway,—shall be taken possession of or occupied by the grantees in the name of the Government, but at their own expense and by their own agents.

Art. 15. The grantees are solely and exclusively responsible for all indemnities and expenses whatsoever and to whomsoever due, which the making, the keeping in repair, and the working of the main Line, its Branches and Dependencies, may give rise to.

Art. 16. The sum of one million of francs deposited with the Government by the grantees, is a security given by them for the due performance of their engagements. The government pays no interest upon the sum. But the amount shall be repaid to the grantees by fifths as soon as they shall have executed works or purchased lands to an amount double the sum they claim to have repaid.

The grantees shall not take any steps to eject the proprietors of land required for the Railway, nor commence any description of works, before having deposited in Belgium two and a half millions of francs, including the security mentioned in the preceding section; satisfactory proof of this deposit must be furnished to the Department of Public Works.

Art. 17. If, at the expiration of one year from the date hereof, the grantees shall not produce satisfactory proof of having paid up two and a half millions of their capital in the manner required by Art. 16, and if at the same period they shall not have commenced the works, they shall thereby forfeit their grant, and shall not be entitled to any further delay or to any further notice of the grant being forfeited.

Art. 18. The grantees shall moreover forfeit all their rights if the works of the Railway shall not be completely finished within the period named in Art. 10, and in the manner therein described. Also in the event of one-half of the works not being finished at the end of the third year.

Art. 19. In case of forfeiture from any of the causes named in the two preceding articles, the completion of the works shall be provided for, by putting the same up to public tender, upon the terms and conditions of the present Convention and with an upset price for the works already executed, the materials provided, the lands purchased, and the portions of the Railway executed, together

with the carrying material. The highest bidder for the whole to be declared the purchaser, and the grantees must accept the sum tendered, even should it be lower than the upset price. They shall have no claim whatsoever upon the government in consequence, or under any pretence whatever. Should the money deposited by the grantees as security have been only partly repaid, the remaining portion due to them shall become the property of the government as an indemnity, and parties tendering will be required to deposit security equal in amount to the sum remaining and which has been forfeited. Should there be no satisfactory tenders for the works, they shall be put up again, upon the same terms, six months afterwards; and should there be then no satisfactory tender, the works executed, the materials provided, the lands purchased, together with the portions of the Railway executed, the carrying material and the part of the caution money remaining in the hands of the government, shall become the property of the state, who may dispose of them as it may think fit, the grantees having irrevocably forfeited their rights and having no claim whatsoever to any indemnity.

Art. 20. The provisions contained in the Articles 17 and 18 shall not be considered applicable, provided the grantees shall establish that the delay or cessation of the works is owing to causes over which they could have no control (cas de force majeure).

Art. 21. If, during the execution of the works it should be found that any parts of them are being executed upon unscientific principles, and in a manner at variance with the conditions of the present convention, the Department of Public Works may order the same to be demolished and rebuilt wholly or in part at the expense of the grantees, and by its own officers, should the grantees refuse to do so upon the first application made to them.

Art. 22. Upon the completion of the works of the Railway the grantees shall cause to be made, at their expense, Surveys and ground Plans of the Railway, the Branches and Dependencies, showing the precise limits thereof, and open to the examination of parties interested. They shall also cause to be made at their expense a detailed and descriptive Account of the entire Line, the permanent way, sidings, works of art, barriers, swing or drawbridges, buildings, &c. A similar account shall be prepared by the Government Engineers; and the two sets duly certified, the surveys and ground plans, together with the "proces verbaux" of the whole, shall be deposited in the archives of the Board of Public Works at the expense of the grantees.

Working and Maintenance of the Line.

Art. 23. All laws and general regulations concerning highways now in force, or which may be hereafter adopted on Roads or Railways belonging to the State, shall be applicable to the Sambre and Meuse Railway and its Branches.

The Government, after having consulted the grantees, will determine the measures necessary to ensure the preservation and safety of the Railway and its Dependencies, and likewise the police regulations to be enforced thereon.

The grantees are empowered to make such regulations as they may think proper for their service, and for the working of the Line, subject only to the approval of the Minister of Public Works. The regulations referred to in the two preceding paragraphs are binding upon the grantees, and in general for all parties using the Railway.

Art. 24. The grantees shall keep the Railway and its Branches and Dependencies, likewise the carrying and locomotive plant, in a perfect state of repair, and in good

working order, during the time of the grant; should they fail at any time to comply with notice to do so from the Department of Public Works, the Government may order the necessary repairs to be executed by its own officers, and shall in such case be entitled to appropriate the receipts of the Railway until the repairs executed and materials furnished be paid for, and one-fifth part of the amount thereof in addition, by way of indemnity.

Art. 25. The Government may institute an inquiry into the state of the Railway and its dependencies, the working plant, &c. as often as it may think proper.

Tolls.

Art. 26. In order to indemnify the grantees for the cost of executing the works specified in the present Convention, and upon the express condition of their fulfilling the obligations herein set forth, the Government authorises them to levy the tolls hereinafter mentioned for the term of ninety years, commencing from the time of the entire line of Railway and Branches being opened for traffic; provided such traffic be conducted entirely at their expense, and by means of their own carriages, waggons, locomotive engines and horses.

TARIFF.

CLAUSE I.

The goods conveyed are to be divided into two Classes, viz.

The First Class comprises goods of every description, excepting those described in the Second Class.

The second class comprises goods of a bulky description, dangerous, fragile, or difficult to convey, liquids, wool, cotton, glass, pottery, or earthenware, drugs, &c.

The Tolls are to be levied in the following manner:

1st. Upon full loads of 4000 kilogrammes.

2d. Upon weights under a full load, viz. less than 4000 kilogrammes.

BY FULL LOADS.

Per league of 5000 metres, and per ton of 1000 kilos.

FIRST CLASS GOODS.

1st. When conveyed throughout the Line, viz. from the River Sambre to the Meuse, or vice versâ, or from one or other of these rivers to any point beyond the summit level which divides their respective basins . . . . . fr. 0·475*

2ndly. When conveyed only from the Sambre or from the Meuse to any part before arriving at the summit level, and not crossing it . . . . . 0·525†

3rdly. When conveyed from any point from which there is a continued ascent towards the summit level . . . . . 0·575‡

4thly. When conveyed from any point from which there is a continual descent towards the basin of the Sambre or that of the Meuse . . . 0·425§

SECOND CLASS GOODS.

These goods are subject to an addition of 5 per cent. upon the prices of the First Class.

FOR WEIGHTS LESS THAN A FULL LOAD.

The tolls to be charged per league and per 100 kilogrammes.

Goods of every description, without distinction of classes:—

5 kilos. and under, to pay..	frs. 0·60	for all distances.
From 5 to 50 kilos.	0·20	per league { the minimum charge being 60 centimes.
50 to 500 kilos. per 100 kilos.	0·12	ditto .... { the minimum charge to be that for 50 kilogrammes.
500 to 4000 & upwards, per do.	0·10	

* Nearly 4¾*d.* † 5¼*d.* ‡ 5¾*d.* § 4¼*d.*

CLAUSE II.

Goods conveyed a less distance than 1500 metres shall be subject to the tolls upon full loads, with an addition of 5 per cent.

CLAUSE III.

The tolls to be reckoned by kilometre, *i. e.* any portion of a kilometre shall be charged as a whole.

CLAUSE IV.

The sender to pay all expenses of loading and unloading every description of goods hereinbefore mentioned.

CLAUSE V.

The sender shall provide waggons and all the necessary apparatus for the conveyance of goods for any distance under 10,000 metres; if waggons be furnished by the grantees, they are empowered to make a charge over and above the tolls hereinbefore specified, which shall not exceed per 0·30 fr. per waggon per league.

When the distance which goods are to be conveyed shall be 10,000 metres or more, the grantees are bound to furnish waggons and the necessary apparatus; in which case the waggons must be loaded or unloaded within three hours of their arrival at the station where they are required. In the event of delay, the senders shall pay to the grantees 10 centimes per waggon per hour for such detention.

Any portion of the hour lost by delay shall be paid for as an hour, and per contra; the hour during which the waggons arrive at their station shall not be considered as forming part of the time allowed for loading and unloading.

CLAUSE VI.

For goods conveyed upon the self-acting inclines, on the branches of the Railway, the grantees are authorised to charge, over and above the tolls specified in the five preceding clauses, frs 0·125 per ton per league.

CLAUSE VII.

The grantees cannot be compelled to convey any dangerous articles or indivisible masses of large dimensions, or those of which the specific gravity shall exceed 2 or be less than 0·5.

Should they at any time consent to convey any such goods, the rate of carriage shall be a matter of special bargain.

Any article, the dimensions of which shall require one or more waggons for its conveyance, shall be paid for as the entire load of the waggon or waggons, whatever may be its weight.

PASSENGERS.

The maximum of the tariff for the conveyance of passengers is fixed at

1. In first class carriages, frs. 0·50 per league.
2. In second „ „ 0·35 „
3. In third „ „ 0·25 „

The minimum charge for the conveyance of any passenger shall be the price of two leagues. Any portion of a league travelled shall be charged as a whole.

LUGGAGE.

Passengers shall not be charged for luggage weighing less than 20 kilos. and the bulk of which shall not exceed 50 centimetres long by 25 and 30 centimetres in width and height, and which may be placed under the seats of the carriages without inconvenience to the other passen-

gers. This luggage is conveyed entirely at the owner's risk.

Luggage, the weight and bulk of which shall exceed the above-mentioned limits, and all luggage confided to the care of the grantees, shall be charged at the rate of frs. 0·30 per league per 100 kilos.

The charge for luggage increases by 10 kilogrammes at a time.

The minimum charge for any luggage to be 50 centimes.

FUNDS AND SPECIE.

For all distances on the Sambre and Meuse Railway, funds, specie, and all other articles the value of which is declared.

For any sums under 100 frs. - - ½ per cent.
„ from 1000 to 5000 frs. ½ per thousand.
For every 1000 frs. above 5000 - ¼ ditto.
This transport is made from Station to Station.

CARRIAGES, HORSES.

For one carriage with four wheels -	3	frs. per league.
„ two wheels -	2	„
For three horses - - - -	3	„
„ two „ - - - -	2·50	„
„ one horse - - - -	2	„

CATTLE.

Per waggon load - - -	2·40	frs. per league.
For three or four oxen -	2·00	„
„ five to ten calves or pigs	2·00	„
„ eleven to twenty sheep	2·00	„
„ one or two oxen -	1·50	„
„ one to five pigs or calves	1·50	„
„ one to ten sheep -	1·50	„

Art. 27. The grantees are authorised to apply the above Tariff to all Sections or Branches of the Line which may be opened before the entire completion of the Sambre and Meuse Railway, under the sanction of the Minister of Public Works.

Art. 28. Should the grantees think proper at any time to lower the tolls as authorised by the preceding Tariff, they cannot raise them again in less time than three months.

Art. 29. The tolls authorised by the present grant are fixed as a maximum; they are considered as being upon a par with those now charged upon the Government Lines of Railway. Nevertheless should the Government raise the rates of carriage upon its Lines above this maximum, the grantees are authorised to raise their tolls in the same relative proportion. They must also reduce their tolls in like manner, should the Tariff on the Government Lines be lowered; without however being compelled to reduce them below the prices of the Tariff herein contained.

The grantees cannot however avail themselves of this faculty until after the Railway shall have been opened for two years.

Art. 30. All changes made in the Tariff upon the proposition of the grantees must be sanctioned by an "arrêté" of the Minister of Public Works, and public notice thereof given by placards and advertisements at least one month previous.

Art. 31. The grantees shall charge one uniform rate of toll, showing no favour or preference to any one. If a reduction be made in any article of the tariff, the department of Public Works shall have the power of declaring such reduction applicable to the whole of the corresponding part of it, and the rates so lowered cannot be raised again in

less than three months. Any reduction or favour granted to the poor shall not be considered as coming within the meaning of this statute.

Art. 32. Soldiers on service travelling in bodies or separately, shall pay only one-half the tariff rate for themselves and their baggage.

Art. 33. Should the government require to send troops, artillery or military stores to any point on the Line of Railway, the grantees are bound to place immediately at the disposal of the Government the whole of their carrying material, and that at one-half of the tariff rates.

Art. 34. Letters and dispatches under the care of an agent of the Government shall be conveyed free of charge by the ordinary trains throughout the entire Line of Railway. For this purpose the grantees shall reserve daily in the rear of one passenger train going in each direction a place sufficiently large, secured by a lock and key, and likewise a suitable place for the courier in charge of the dispatches.

Art. 35. In the event of the Government requiring special trains, a distinct agreement as to the charge to be made shall be entered into every time they are required.

Art. 36. In consideration of the right hereinafter granted of levying tolls in the manner hereinbefore described, and with the exceptions above stipulated, the grantees are bound to perform the service of the Railway constantly, with care, regularity, promptitude, and without any preference to any party, and to convey at their own expense, and by means of their own carrying material, merchandize and goods of all descriptions, likewise passengers and their luggage, carriages, horses, cattle, funds and articles of a declared value which may be confided to them.

Art. 37. The incidental expenses not enumerated in the

tariff, such as those of loading, unloading and warehouseing, shall be regulated by a scale of charges, to be approved of by the Department of Public Works.

Art. 38. Waggons belonging to private individuals or to companies, must have their wheels of precisely the gauge of the Railway; these waggons must moreover be in every respect as well and as firmly constructed as those of the grantees. The maximum weight of their load must not exceed that fixed by the grantees for their own.

Art. 39. It shall be lawful for any party to establish upon the Line or Branches, at any point he may think proper, warehouses or loading places, with machines, engines or apparatus for facilitating the loading and unloading of waggons, &c.: provided that he lays or causes to be laid down one or two sidings, so that the waggons in loading or unloading shall not in any way interrupt or retard the traffic upon the main Line or Branches.

Art. 40. It shall also be lawful for all parties to make such Branches terminating at the main Line of Railway or its Branches, as may not require a Grant from Government authorising the levying of tolls.

Art. 41. The grantees of the Sambre and Meuse Railway shall on no occasion create any obstacle to the making of these Branches, nor to those which may be made by virtue of Article 49, respecting which the grantees shall have declined to avail themselves of the preference given to them by Article 60, of the present convention. Moreover, the making of these Branches shall not give rise on the part of the grantees to any claim for indemnity: provided no impediment be created to the traffic on their Line, or that they be not put to any extra expense thereby.

The grantees engage to offer no obstacle to the working of these Branches, and engage to adopt, as regards them,

the same regulations as shall be laid down in the convention to be hereafter made between themselves and the Government for the circulation of their respective carrying material on each other's Lines.

Art. 42. During the term of the Grant, no tolls or rates of any kind shall be levied upon the Main Line of the Sambre and Meuse Railway or on its Branches, either by the Government, or by one or other of the provinces, or by any of the " communes" traversed by the said Railway.

General Conditions.

Art. 43. The choice and appointment of parties to execute the works of the Railway, the working of the Line and collection of the tolls, are vested exclusively in the grantees; but the Government reserves to itself the right of naming such officers as may be sworn in to perform the police duties, in accordance with the law of 15th April, 1843.

Art. 44. The Government will superintend, through its agents, the first construction of the Railway, its maintenance, and also the working thereof. This superintendence shall be paid for by the grantees; to provide for which they shall, within three months from this day, pay into the hands of the party appointed to receive the same the sum of 12,000 francs; this payment to be continued annually during the execution of the Works; and afterwards, during the term of the grant, within the first three months of each year, the annual sum of 1000 francs.

Art. 45. The superintendence which the Government will exercise, in the manner described in the preceding article, having no other object than to prevent the grantees neglecting any duty incumbent upon them, and being exercised solely for the public benefit, the Government does not thereby contract any obligation whatever.

Art. 46. At the expiration of the Grant, the Railway and its Dependencies must be in a perfect state of repair; therefore, if, during the five years which shall precede that period, the grantees shall not take steps to comply with this provision in the most satisfactory manner, the Government shall be empowered to attach the receipts of the Railway and to employ them in repairing the Line and all its Dependencies.

Art. 47. From the period at which the Grant shall expire, the Government shall immediately become possessed of all the rights of the grantees, together with the Railway and its carrying material, and be also entitled to the receipts and profits thereof. The amount of the carrying material, to be taken at a valuation made by each party, shall be paid to the grantees, but without any premium.

Art. 48. The grantees have the faculty of forming a Company " en nom collectif," or " Société anonyme," and to issue shares; provided always they conform to the laws and regulations upon these matters; such shares can only be issued upon provisional certificates, upon which 30 per cent. shall have been paid.

The shares shall not be quoted, either on the exchange of Antwerp or on that of Brussels, until after the entire completion of the Railway.

Should the grantees avail themselves of this privilege, they shall still remain answerable to the Government for the completion and perfect execution of the works, according to the conditions specified in the present convention; and even in the event of their forming a "Société anonyme," and of their obtaining the sanction of the Government to their statutes, such approval is to be considered as granted solely with a view of giving the Company a legal constitution, and shall in no way exonerate the original contracting parties, or allow them to substitute other parties in their place.

Art. 49. The Government reserves to itself the right of authorising the construction of any Roads, Canals or Railways in the District of the Sambre and Meuse, or elsewhere.

The grantees shall not be entitled to any indemnity whatsoever on account of such constructions, or on account of:—

1st. Any modifications which may be made in the turnpike tolls or others, collected either upon rivers, roads or canals (voies de communication), now in existence, or which may be made during the term of the Grant.

2ndly. On account of any modifications in the Customs' Tariffs.

3rdly. On account of any measures taken, or caused to be taken, by the Government within the limits of its authority.

Art. 50. In the event of the Government ordering or authorising the construction of any Roads, Canals or Railways which may cross the Railway herein conceded, or any of its Branches, the grantees shall offer no obstacles to their being made, nor claim on this account any compensation beyond the repayment of any additional costs of maintenance which such construction may occasion them; the Government undertaking to execute, at its own expense and without any charge to the grantees, all the temporary or permanent works which may be necessary to prevent the working of the Railway from being interrupted or interfered with.

Art. 51. In all cases wherein the Government shall have a claim for damages, according to the terms and stipulations herein contained, they shall be paid by the grantees without the Government being compelled to prove that it has sustained any loss or injury.

Art. 52. In no case whatsoever shall the grantees avail themselves of the plea of "force majeure," unless they shall have afforded the Government the opportunity of ascertaining its nature and extent within thirty days from the time of the circumstance occurring which shall give rise to the obstacle.

The same conditions shall be applicable to cases where the grantees may consider they have a right to complain of the acts of the Department of Public Works, or those of any of its agents; they shall not avail themselves of such acts, unless at the time of their being committed, or within thirty days at the latest, they shall have made the Government acquainted with the precise nature and the effect produced thereby.

Art. 53. In no case can the guarantees found any claim upon orders given to them verbally, neither shall verbal orders be at any time binding upon them.

Art. 54. The expiration of the time allowed for the fulfilment of any of the obligations contained in the present Convention, shall of itself be a sufficient notice to the grantees; they shall not be entitled to receive such notice by any judicial act.

Art. 55. The grantees must select a place of residence (domicile d'élection), where all communications and orders issued by the Department of Public Works may be addressed to them; all such documents being forwarded to the grantees through the ordinary official channel, and a receipt given for the same at their elected residence (domicile d'élection), in order that their date or authentic character may not be called in question.

Art. 56. The grantees hereby declare that they accept the preceding stipulations as emanating from themselves. They declare that they have examined the data, and the calculations upon which the undertaking is based; that they

have ascertained as correct all that is contained therein, and the possibility of executing all the necessary Works; therefore the Government shall not, under any circumstances, be held responsible for any errors, imperfections, or omissions, which may exist in the plans of the proposed Line, nor for any difficulties which may arise during the execution of the work.

Art. 57. Should any objects of art, antiquity, natural history, or coins of any description, be discovered in making the Railway, such objects shall become the property of the Government.

Art. 58. The registration duties of the present Act are fixed at one franc seventy centimes.

Art. 59. The grantees engage to execute, at their own cost and risk, in the manner laid down in the present Convention, the extension of the Couvin Branch towards the French frontier, near Rocroi, so soon as the construction of a Railway from the said frontier towards Charleville shall be decided upon, and the necessary measures taken to ensure its execution.

Art. 60. The Government reserves to itself the right of authorising the execution of Branches and other accessory Railway communications in the district of the Entre Sambre et Meuse, in conformity with Article 49 of the present convention. The Company shall have the preference for the execution of those Branches and communications, which shall be made the subject of new grants, to be sanctioned by Arrêté Royal, and based upon the Conditions of the original concession.

Art. 61. All provisions and stipulations contained in any former Acts, and not contained in the present Convention, shall be considered as null and void.

Executed in duplicate at Brussels, 27 March, 1845.

The Convention is signed in the name of the Com-

pany by John Peter Fearon, of London, for himself, and by procuration, dated the 22 March, 1845, for William Parry Richards, Thomson Hankey, jun., and William Goodenough Hayter; and by Augustin Tercelin Sigart, Banker, of Mons; and also by the Minister of Public Works on behalf of the Belgian Government.

J. P. FEARON,
TERCELIN SIGART.

A. DECHAMPS.

To be annexed to the Arrêté Royal dated this day.

The Minister of Public Works,
A. DECHAMPS.

Brussels, 28 *March*, 1845.

IMMEDIATELY after the completion of the definitive arrangements with the Government, the Directors of the Company instructed Mr. Stephenson to proceed to Belgium in order to examine the whole of the Undertaking, and to give them his advice as to the best mode of availing themselves of the latitude given to them by the Grant in making alterations in some portions of the Line, and of bringing into full effect the extensive powers which had been conceded. In this investigation he was accompanied by Mr. Sopwith, whose previous examination of the country had given him a minute acquaintance with its resources.

The following is a Copy of Mr. Stephenson's Report.

MR. STEPHENSON'S REPORT.

TO THE DIRECTORS OF THE SAMBRE AND MEUSE RAILWAY COMPANY.

GENTLEMEN, MONS, *2nd April*, 1845.

IN compliance with your instructions under date of the 20th ultimo, I beg to state that, accompanied by Mr. Sopwith and Mr. E. F. Starbuck, I proceeded to Belgium on the 22nd ultimo; and devoting one day in Brussels to the examination of the Plans and Sections of the Sambre and Meuse Railway prepared by the Belgian Engineers, we proceeded on the morning of the 25th ultimo by Railway to Charleroi.

The first step which I considered necessary to take was to investigate the nature and extent of the Coal Field, and also the geological character of the district through which the Railway was intended to pass, and further, to thoroughly examine the various ravines between the Sambre and the Meuse, so as to ascertain whether the best route had been taken. I also deemed it incumbent on me to inform myself of the nature and extent of the numerous Iron Mines that exist between the Sambre and the Meuse, as well as the various places where Slate and Marble are produced for sale.

I will now describe the route we pursued, and the steps

I took to satisfy myself as to the extent of these various sources of Traffic. In the neighbourhood of Charleroi, I examined the principal part of the Coal Field, as well as the position of the extensive Iron and Glass Works, and other manufactories which abound in that populous district, having the advantage of being accompanied by Mr. Sopwith, who had previously examined this subject in great detail, and whose Report (already in your possession), as far as I have been able to investigate it, appears to me correct. We then proceeded toward the Meuse, examining the features of the country as far as Sedan in the Ardennes, more particularly devoting my attention to the direction of the Line to the Frontier of France and to the facilities for the continuance of the Line in France.

Leaving Sedan, we proceeded to Namur, and had thus an opportunity of examining the Slate Quarries of Rimogne and Fumay, which produce large quantities of Slate.

Proceeding from Namur, I resumed my investigation of the Charleroi Coal Field, and particularly examining the Valleys which appeared to offer any outlet for Mineral Produce, and more especially of Coal on the one hand, and Iron Ore on the other. We then pursued our journey to Mons, thus obtaining a sufficiently correct idea to enable me to report to you the course which I consider most expedient to be taken in the construction of the Line of Railway from the Sambre to the Meuse.

I shall therefore now proceed to give you my views as to the general character of the project, and of the measures which I deem expedient to be taken under the circumstances referred to my consideration.

It is strongly pointed out by the nature of the country, that the valley of the River Heure (which your Line adopts) is decidedly the best route to follow in approaching the summit of the country between the rivers Sambre

and Meuse. It is further decidedly the best direction for approaching the richest part of the Iron Mine District by means of Branches in the lateral Valleys. It appears that a strong desire exists with many parties, that the main Line of Railway, as at present proposed, should be altered, so as to pass by Philippeville, and power is given by the law to the grantees so to alter it, if they shall think fit:—this important point, therefore, received my particular attention, and I have to state my decided objection to the main Line taking that course, and approve of the direction of the Line as at present laid out, for the following reasons:

The Line if carried by Philippeville would be longer and more costly, would present steeper gradients than the Line at present proposed, nor could any increase of traffic be calculated on in consequence of the main Line being taken in that direction. Moreover, I consider that a Branch Line may be so constructed as to be more convenient to the Town and the Marble Works in its neighbourhood, and for this purpose you have powers reserved.

The other Branches in this district, viz. one by Thy-le-Château, the other from Walcourt, appear to me well laid out for approaching the richest part of the Iron Mine District; it may however be found necessary to extend them, by following the valleys towards Morialmé and Florennes, as by this means the Mineral Produce can be easily conveyed into the valleys in either direction by inclined Planes. The Iron Mines being situate on both sides of each valley, a greater convenience of transport would by this means be given to the Mineral Production. When once the main Line of Railway has been opened out, the local details of these Branches will suggest themselves; but as a principle, I recommend the Valley Lines to be taken.

I next come to the consideration of the question as to the most advisable means of passing the Summit Level, and decidedly prefer the plan now selected to any of the circuitous routes represented on various plans which have been proposed. I recommend, however, that a further inspection of this part of the Line be made previously to its execution, to ascertain whether any further improvement can be made.

The Gradients approaching the Summit Level are such as will admit of powerful Locomotive Engines overcoming their ascent with all Loads up to One Hundred Tons with the usual Railway speed; but this limitation to One Hundred Tons would be confined to the Gradients at that point which form but a small portion of the whole; those on the rest of the Line being generally easy. The Line is therefore one calculated efficiently to accomplish the rapid conveyance of Passengers, as well as the economical transit of goods.

After passing the summit, and from thence to Mariembourg, it appears to me that the general direction of the Line is well chosen.

From Mariembourg the Line nearly follows the course of the River Viroin to its junction with the Meuse at Vireux; arrived at this point, I consider the Meuse to be a great highway, as far as traffic is concerned, and the Coal which will be brought from Charleroi to this point will have the advantage of the improved navigation of the River towards Givet on the North, and Mezières and Sedan on the South. Extensive improvements having been made in that part of the River which is in the French territory.

It has been suggested by some parties, that a Canal ought to be formed in this valley, i. e. from Mariembourg to Vireux. I entirely dissent from this proposition, much preferring the continuation of the Railway, as authorised

by your grant, to the River Meuse. The valley of the Viroin is favourable to the construction of the Railway, presenting no difficulties and traversing a rich Mineral district.

With the information I have before me, I am of opinion that the Sambre and Meuse Railway should terminate at Couvin on the one hand, and at Vireux on the other, until further investigation shall decide the direction which any French Line of Railway may take in approaching this Line, whether by Rocroi or the Valley of the Meuse.

In conclusion it may be well for me to remark, that from the abundance of Iron Mine existing in the route of this Line, and which will be conveyed so conveniently to the Coal Field, I am induced to believe that your project will prove a beneficial one; and further, that it will unite with those Lines, which will ultimately be carried to the Eastern Frontier of France, and Westward to the important Towns on the route to Paris, thus forming, in addition to its local resources, a link in the Railway communication between Belgium, France, Switzerland, and Germany.

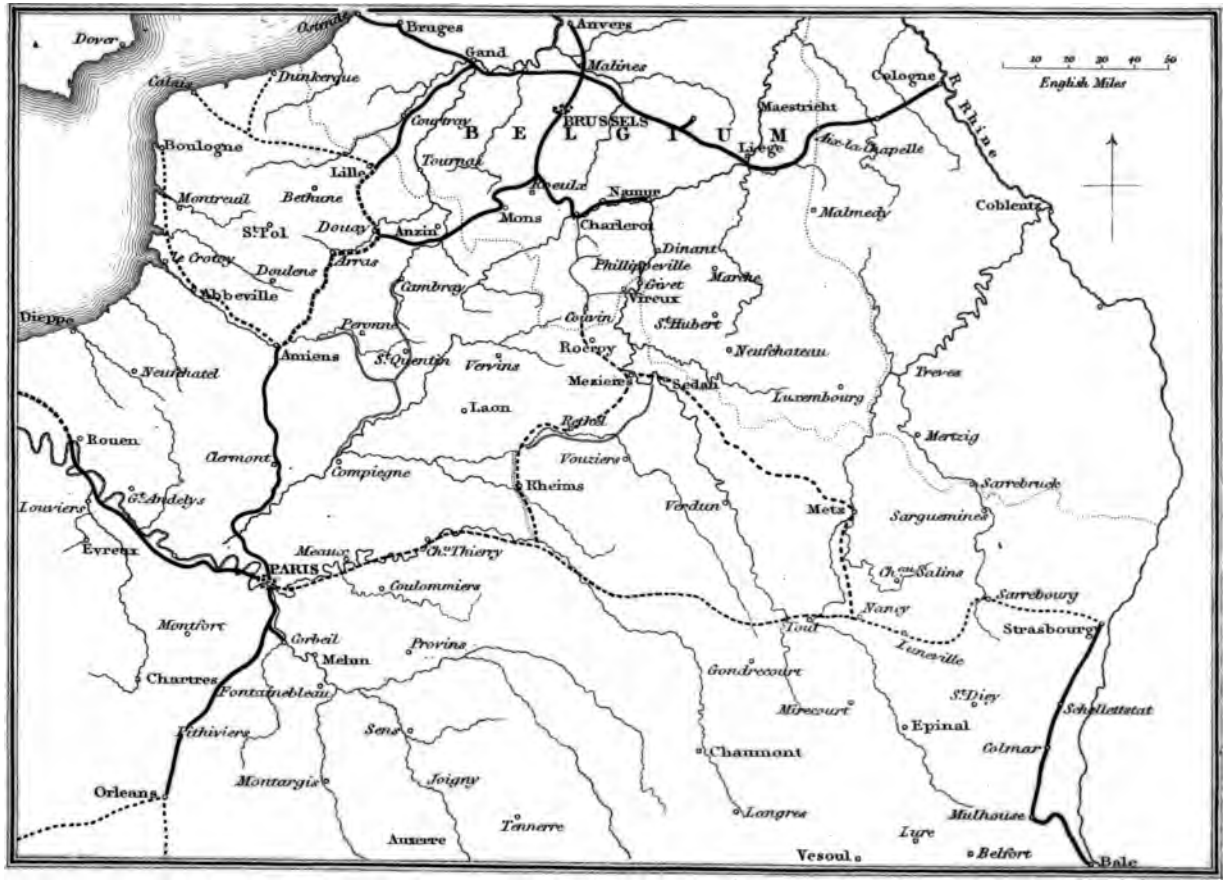
I remain,

Gentlemen,

Your very obedient and faithful Servant,

GEO. STEPHENSON.

In the earlier stages of the proceedings relative to this Company, and preparatory to its adoption by the present promoters, a minute investigation was undertaken as to the Resources of the District proposed to be opened, and inquiries were made from parties possessing the best information on the subject. The Directors have considered it desirable, for the satisfaction of those who may be disposed to look closely into the prospects of the Undertaking, to publish in detail the results of these inquiries, for which they are indebted to Mr. Sopwith.



RAILWAYS IN THE NORTH OF FRANCE & IN BELGIUM

SHOWING THEIR CONNECTION WITH THE PROPOSED SAMBRE & MEUSE RAILWAY

ACCOUNT

OF THE

SAMBRE AND MEUSE RAILWAY,

AND OF THE

Mineral Statistics and General Traffic

OF

THE DISTRICTS THROUGH WHICH IT IS INTENDED TO PASS.

THE proposed SAMBRE and MEUSE RAILWAY will form a communication between the River Sambre, near Charleroi, and the River Meuse, at Vireux, passing through the important mineral district, which, from its being included between these two rivers, is commonly called The District of the Sambre and the Meuse.

The Railway comprises a Main Line 40½ miles in length, having Branches communicating with the Iron Mine Districts in the direction of Morialme, Philippeville and Couvin; and under the arrangements described in the sequel the Main Line will form part of a great line of communication extending from Belgium towards Switzerland, connecting Brussels with the manufacturing Towns of the department of the Ardennes, by Railways which are either contemplated or already in progress towards Paris, Strasburg and Basle.

The Sambre and Meuse Railway connects the great

Coal Basins of Hainault and Namur with the Iron Mines in the Central and Southern portions of the District of the Sambre and Meuse; it affords increased facilities for working the mineral products of the country traversed by the Railway, especially Iron, Marble and Slate, which exist in great abundance, and are extensively worked in various parts of the district. It will also convey the produce of vast Forests, which cannot now be rendered available for commercial and mining uses, owing to defective means of transport. It will afford also the advantages of locomotive travelling in a populous district, where a large traffic already exists, notwithstanding the present imperfect and expensive modes of carrying goods in cumbrous waggons over bad roads, which in winter are almost impassable; it will, moreover, furnish the agricultural districts with coal for burning lime, and enable the inhabitants to obtain cheap supplies of mineral fuel at all times, the use of it being now limited, and in some parts wholly prevented, by the causes above alluded to.

Independently of the above and other obvious advantages of the proposed Railway in the immediate territory through which it passes, it is of great importance to the mining and manufacturing interests of the district near Charleroi, by effecting a cheap, safe, rapid and uninterrupted communication with the River Meuse at Vireux, instead of by the River Sambre to Namur, and the costly, dangerous, slow, and frequently interrupted, navigation of the Meuse to Vireux, being in fact the substitution of a journey by railway on one side of a triangle, in place of navigating the other two sides. The distance from the terminus of the Railway, near Charleroi, to Vireux, is 40½ miles by the Railway, and 78½ miles by the Rivers Sambre and Meuse.

The Northern parts of Belgium, which are for the most

part extremely level, and exceedingly populous and fertile, afford throughout a large part of the kingdom great facilities for the construction of Railways, and lines are already made extending from Ostend to Ghent, Malines, Louvain, Liege, and Verviers, in an East and West direction, with connected Railways to Courtrai and Mouscron, on the French Frontier, and to Aix-la-Chapelle and Cologne in Prussia.

From Antwerp another Line extends, by way of Malines and Brussels, to Braine-le-Comte, whence two lines diverge, one to the borders of France near Valenciennes, by way of Mons, and the other to Charleroi and Namur. The Sambre and Meuse Railway commences at or branches out from the last-named Railway at Marchienne au Pont on the River Sambre $1\frac{1}{2}$ miles West of Charleroi, and immediately enters the Valley of the River Heure, which it ascends for a distance of 21 miles. The first 8 miles of this distance are in the judicial Arrondissement of Charleroi; the whole of the remainder of the Railway is in the Province of Namur, with the exception of about $1\frac{1}{8}$ miles on the French side of the Frontier at Vireux.*

The main Line of Railway, from Marchienne au Pont on the Sambre to Vireux on the Meuse, forms an unbroken Line for locomotive travelling with no gradient exceeding 1 in 200, except for a short distance near the summit level, where the ascent is 1 in 125. The elaborate examinations made on behalf of the Belgian Government have confirmed all the main features of the plan, as designed by the originators of the project. Some alterations may possibly be made in execution in the eastern part of the Branches towards Morialmé and Florennes, with a view to the local convenience of the Mines, power being reserved in the

* A royal ordinance for making this portion of the line was granted on the 9th March, 1845.

Convention with the Government to introduce such improvements, subject to the approval of the Minister of Public Works.

There are no curves on the main Line from Marchienne to Couvin with a less radius than 450 metres, except one of 400 metres,* and it occurs in a gradient of one in 500. So far, therefore, as general direction, moderate gradients and easy curves are concerned, the Line possesses all the advantages of which the nature of the country admits, and which are obviously such as to afford great facilities for the transport of minerals and other general purposes of Railway communication.

The importance of the Terminus at Vireux is evident, when it is considered that £280,000 have been expended in the last six years in improving the River Meuse, within the French territory, from Givet to Mezières and Sedan, by which means the carrying of coal and other traffic is greatly accelerated, as compared with the slow and frequently interrupted navigation of the same river from Givet to Namur, throughout which distance it is in Belgium. The extensive ironworks and the rich mineral and forest district of Couvin also require Railway communication.

It is extremely probable that, as soon as the Sambre and Meuse Line is commenced, a continuation of it to Mezières and Sedan, which has long been contemplated, will be proceeded with. The country offers great facilities for the construction of a Railway, and the advantages which would result from such an extension of the Sambre and Meuse Railway are evident on an inspection of a map of the district.

There are four Tunnels on the proposed Sambre and

* 400 metres is about 2½ yards more than a quarter of an English mile.

Meuse Railway, the lengths and gradients of which are as follow:—

1	475 yards—	one in 200
2	547 do.	one in 125
3	498 do.	one in 200
4	207 do.	one in 166.

These Tunnels are in grey sandstone rock, in carboniferous limestone, and in argillaceous schists, none of which present any difficulty in the execution, nor are they Works of such magnitude or expense as to require a detailed description. They are adapted for a single Line of Railway, conformably to the system followed on many of the Government Railways, but the number of passing places intended to be made, is such as to admit of a very large Traffic being carried on without delay or interruption. The Bridges and other Works, the Cuttings, Embankments, &c., are all of an ordinary description, presenting no case of what in England would be considered an engineering difficulty. The rigid surveillance of the Belgian Government, indeed, admits of an unusual degree of accuracy being attained in the preparation of the Plans, Sections and Estimates; for its officers, being responsible, have no interest in attempting to establish a low estimate. On the contrary, the whole of the investigations which have been made on behalf of the Sambre and Meuse Railway Company confirm the statement made by the Government Engineers, that they had invariably taken the maximum of expense and the minimum of anticipated revenue, as is expressly stated in the Report of M. de Moor, the chief engineer employed on this occasion by the Belgian Government.

GEOLOGICAL STRUCTURE.

The geological structure of the Sambre and Meuse district being different to that of the northern and central parts of the kingdom, in which the existing railways have been chiefly constructed, the surface of the country no longer presents the widely extended plains which in most other parts of the kingdom have been so favourable for the execution of Railways. The strata of the coal formation, resting on carboniferous or mountain limestone, form either moderately elevated hills or table-land districts, the height and numerous undulations of which render it necessary to adopt some of the numerous vallies which intersect them as the general direction of any locomotive line of railway; and it fortunately happens, that, except in crossing the ridge which forms the summit level, a succession of vallies occur in a nearly direct line the whole distance between the commencement of the Sambre and Meuse Railway at Marchienne au Pont and its termination at Vireux. These vallies, though for the most part narrow, and occasionally tortuous, are yet highly favourable for the construction of Railways, owing to the perfectly level *holmes* or meadows formed on the margin of their streams by the deposition of alluvium. The few abrupt bendings which occur, admit of the Railway pursuing a tolerably direct course, either by cuttings of no great magnitude, or by short tunnels. The strata throughout the line and branches consist of alternations of the sandstones and shales of the Coal Formation, with numerous seams of workable coal occupying the northern portion only of the district; of rocks, analogous to the millstone grit, separating the coal measures from carboniferous limestones, which abound in numerous rich and easily accessible deposits of Iron Ore; and beneath them

are the lower conglomerates, Limestones and Schists, to which, in England, the name of Devonian has been recently applied. Among these, as well as in the Carboniferous Limestone series of rocks, are vast quantities of beautiful Marbles, veins of Lead Ore, and deposits of Iron Ore, exceedingly rich in quality; and within a few miles of the South Terminus of the Railway at Vireux, a still lower series of rocks present a vast abundance of excellent roofing Slate, which is extensively worked at Fumay and other places.

It is unnecessary here to enter upon any detailed account of peculiarities of geological structure in this district, further than as they bear on the consideration of Mineral Traffic, which forms one of the principal foundations of the enterprize. The base of the chief mineral formations is Slate, which, by vast geological changes, has been thrown into undulations presenting a succession of saddles and basins, rendering the most productive strata accessible at various points.

In the excellent geological work of J. J. D. Omalius D'Halloy, entitled "Coup d'Œil sur la Géologie de la Belgique," it is stated that a first glance at the divers rocks forming east and west bands would induce an observer to suppose that the country was composed of a great number of superincumbent systems; but Professor Dumont has shown that the whole may be considered as being composed of four stages or systems alternating, which form a species of basins more or less inclined one within the other, and of which the edges are sometimes turned over.

The first stage or series is composed of quartzose rocks, and a great variety of schistose rocks called "Poudingue de Burnot," from its being well developed at Burnot, on the banks of the Meuse, between Namur and Dinant.

The second in ascending order is "Calcaire de Givet," or Limestone of Givet, producing grey marbles, which are worked in the country between the Sambre and the Meuse.

The third, called "Psammites," forming the superior part of the plateau of the Condros, and containing deposits of red marble.

Fourth, the Limestone of Visé, seen best in the quarries of that place, and celebrated for its fossils, and kidneys of anthracite. It produces the marbles called little granites, and the black marbles of Dinant and Namur. The upper part of it is intimately mixed with the coal formation. In the environs of Namur two small beds of anthracite are intercalated with the limestone. In other places, the beds are whitish or a smoke-grey, more or less shaded by darker tints, and resembling the Napoleon Marble at Boulogne.

These four stages or systems occupy nearly the whole of the territory lying between the Sambre and the Meuse; and they produce in vast quantities four important elements both for the construction and traffic of the intended Railway, which crosses the whole of them. These are, *quarries of excellent and durable building stone* accessible at almost every part of the Railway; *extensive deposits of Iron Ore* in the immediate vicinity of the main line and branches; *an inexhaustible supply of Limestone for Agricultural purposes; and a great abundance and variety of beautiful Marbles:* all which are now comparatively buried, and must remain so until a greater facility of transport, and cheapness of coal, shall bring them into full activity.

MINERAL STATISTICS.

Both in mineral products and industrial operations the district of the Sambre and Meuse bears a considerable resemblance to the mining districts of the north of England, where the system of Railway communication first originated in the conveyance of mineral produce. The immediate vicinity of Charleroi, abounding with numerous and extensively wrought collieries, with iron works of great magnitude, glass houses, and other manufacturing establishments, presents on a less scale, but yet in a very considerable degree, the same features which are so conspicuous on the banks of the Tyne near Newcastle. The country for many miles round Charleroi is thickly studded with human habitations, either singly or in villages, and presents an animated scene of untiring industry. The middle part of the Sambre and Meuse district is analogous, both in geological character and mineral produce, to the country from ten to thirty miles west of Newcastle; and the hills and dales of the southern portion of the country to be traversed by the Railway contain mineral veins, which, if fully explored, would probably complete the resemblance, by furnishing lead ore, which has been ascertained to exist in considerable quantities, although no extensive operations have been pursued under the adverse influence of defective and expensive means of communication hitherto existing.

In a district so replete with the elements of an extensive traffic, it is surprising that the obvious and essential improvement of a Railway communication has been so long deferred, more especially as the relative position of the coal and iron points out the necessity of obtaining more economical means of transporting the one to the other. In many of the chief mining districts in England, and

especially in Shropshire, Staffordshire and South Wales, coal and iron are found in alternate beds in the same series of rocks, and are extracted from the same mines. But in the Sambre and Meuse district the coal exists only near the northern terminus of the Railway, whereas the iron is found only in the central and southern parts of the Line; hence an important element of mineral traffic is supplied by the requisite interchange.

COAL FIELDS OF BELGIUM.

The Coal Basin, in the midst of which this Railway has its commencement, is the most important in Belgium. Its general direction nearly corresponds with that of the River Sambre from Namur to Charleroi, and it attains a width of nine miles at the latter place. It then continues about six miles in width to Mons, and extends beyond the French frontier in the direction of Valenciennes and Douai, beyond which its existence is scarcely to be traced. The extent of this basin is in length about nineteen miles in the province of Namur, forty miles in the province of Hainault, and twenty-eight miles on the French side of the frontier, the whole extending over an area of upwards of six hundred square miles. As compared with its superficial area or quantity of land, Belgium possesses nearly the same relative area of coal deposits as Great Britain, viz. in the proportion of one twenty-second to one twentieth part, and larger than France in the proportion of one twenty-second to one two hundred and tenth part.

COAL BASIN OF CHARLEROI.

The produce of the Coal Basin of Charleroi is very considerable, amounting in 1842 to 1,133,168 tons of 1000 kilogrammes, which are nearly equal to the English ton, or 1016 kilogrammes (1015·92.) It contains upwards of

forty different seams or beds of coal, now being worked. They vary in thickness from a foot to about four feet. When less than a foot they are not workable, and they rarely exceed four feet; when they do so, it is commonly caused by some peculiar derangement of the strata affecting the nature of the coal, so that what is gained in quantity is lost in quality. The average thickness of the workable coal is about twenty inches, corresponding in this respect with the coal mines of the Bristol coal fields in Somersetshire. The dip of the strata, within a circle of about five miles round Charleroi, is extremely variable, being found at almost every angle of inclination, and in some places it is perpendicular. Beyond this circle, to the east of Charleroi, the beds usually dip at an angle of 14° or 15° towards the south. This irregularity of dip occasions additional expense in working, but this is compensated for by the increased number of points at which the coal may be obtained within the same superficial extent. No accurate data exist by which the period of the first working of coal in this basin can be determined. It appears that although official documents exist of permissions to extract coal as far back as 1297, yet it was not carried on to any considerable extent until the beginning of the eighteenth century. The first steam-engine for draining the mines was erected here in 1737. The recent progress of the coal trade of the Charleroi district during fourteen years shows a steady increase, as appears by the following account of the quantities raised in the respective years, in round numbers :—

Year.	Tons of 1000 kilogrammes.
1829	400,000
1831	550,000
1833	520,000
1835	510,000

Year.	Tons of 1000 kilogrammes
1837	750,000
1840	930,000
1841	1,080,000
1842	1,130,000

The Coal of Charleroi, besides the immediate consumption of the neighbourhood, supplies Brussels and the Flanders, the Banks of the Meuse from Namur to Sedan, the entire Department of the Ardennes, and portions of those of the Marne, the Aisne and the Meuse, whose united population amounts to one and a half millions. It is also sent by the Upper Sambre towards Maubeuge and Landrecy; and since the opening of the Sambre and Oise Canal, the Coal of this district has also reached Paris, Rouen and Elboef, where its consumption is rapidly gaining ground.

QUALITY AND PRICE OF COAL.

The Paris paper "L'Indépendant," No. 115, published Monday, October 23rd, 1843, contained the following notices relative to the estimation in which the Coal of Charleroi is held in Paris:—

"A very important decision for the Mines of Charleroi, and which proves the superiority of its Coal, has just been come to by the Administration of the Public Hospitals, after several years' trial of it. It has decided upon receiving no other kind of Coal but that of Charleroi, for warming these Establishments; and in their public notices for tenders, inserted in the newspapers, this condition is formally announced.

"The Town Council of Paris has also given the preference this year to the Coal of Charleroi at all its establish-

ments for supplying water, after a variety of comparative trials with Coal from five other localities. These trials were made with great minuteness, in the presence of the city engineers and of other parties interested. The advantage in favour of the Charleroi Coal was very considerable. This preference will explain, if it were necessary, that which has so long been given to the Charleroi Coal in Belgium, and which it is beginning to obtain in France during the few years it has been tried. In fact, a Coal which has great heating power, which burns without smell and almost without smoke, and which at the same time is so cheap, is all that can be desired. It is coming into extensive domestic use in Paris and its environs, and is equally approved."

The different qualities of the Charleroi Coal are distinguished by the names of "Gras," or Bituminous; "Demi-gras," or Semi-Bituminous; and "Maigre," or Poor-Coal. Each of these qualities is again divided into several classes, viz. the "large Coal," or lumps selected in the mine. What remains after these are taken away is called "Charbon tout venant," or Coal of all sorts; it is also called "Charbon gailleteux." "Gaillettes," or round Coal, are pieces less than the large Coal, and which cannot be sold as such, but yet not less than 15 centimetres (nearly 6 inches) in thickness.

"Gailletterie," or screened Coal, is the Coal which is left after the Gaillette has been taken out, and the coal dust also. Gailletterie may be otherwise described as Coal which has been passed through a screen of 10 centimetres (very nearly 4 inches), and which would not pass through a screen of 3 centimetres (nearly an inch and a quarter).

The small Coal or "Menu" is what will pass through a screen of 3 centimetres (1·20 in.)

The present price of Coal at the pits near Charleroi is as follows :—

		s.	d.
Charbon Gras,	in large Coal	15	2
Do.	in round Coal	13	3
Do.	in screened	11	2
Do.	in small Coal	4	10
Do.	in mixed	7	2

Average price of Charbon Gras, 10*s.* 4*d.*

Demi-gras,	in large Coal	13	7
Do.	in round Coal	11	2
Do.	in screened	10	5
Do.	in small Coal	3	2
Do.	in mixed	5	7

Average price of Demi-gras, 8*s.* 10*d.*

Maigre,	in large Coal	10	5
Do.	in round Coal	8	0
Do.	in screened	6	5
Do.	in small Coal	2	5
Do.	in mixed	4	0

Average price of Maigre, 6*s.* 3*d.*

The average price of the three kinds of large Coal is 13*s.* 1*d.*, of round Coal 10*s.* 10*d.*, of screened 9*s.* 4½*d.*, of small Coal 3*s.* 6*d.*, of mixed Coal 5*s.* 7*d.*; and the average price of all the several sorts of Coal is nearly 8*s.* 6*d.*

The duties on the working of Coal are of two kinds, a fixed duty and a proportional duty.

The fixed duty is paid to the proprietor of the surface, and amounts to about 10 centimes per hectare per annum (less than an halfpenny an acre), which is levied upon the whole extent of the grant. This duty is so small, that it may be considered merely as a legal acknowledgment of the rights of the owner of the soil in the kind of expropriation to which he is subjected, by the party obtaining the grant of a mine on his property.

The proportional duty is regulated by the law of 1810,

and varies according to the wants of the state, but cannot exceed 5 per cent. It now amounts to 2½ per cent. on the net profits, after deducting the expense of works executed within the year or in progress. The duty is fixed for each pit, either by compounding for a certain sum, by a valuation made by the mining engineers, by an examination of the books of the colliery, or, in the event of dispute, by a provincial commission, which meets every year to decide such questions.

RECENT AND PRESENT COAL TRADE OF CHARLEROI.

About seven or eight years ago a sudden and remarkable extension of the Coal trade of Charleroi was occasioned by an extension of the Iron trade, which was disproportioned to the wants of the country, or the chances of an export demand under the peculiar disadvantages arising from the wide separation of the Coal and Iron Mines, and the defective and costly means of intercommunication, which is absolutely essential to the well-being of an Iron manufacturing district.

One effect of the establishment of these extensive Iron works was a demand for Coal far beyond what the district was then prepared to furnish. The price of Coal rose accordingly, and this led to the fresh investment of capital in opening out new Collieries. This rise in the price of Coal checked the Iron trade at its very outset—it consequently declined, and the demand for Coal fell with it. The Coal trade of the district generally became embarrassed, and has since continued so as regards the undue extension above described, but not so as regards a steady and reasonable state of trade. This is evidenced by the regular increase which has taken place since 1837; and the present condition of the Coal trade of Charleroi strongly

points out the value of improved means of transport. The proposed Sambre and Meuse Railway would unquestionably augment the demand for Coal to an extent far beyond what it would be prudent to rely upon as the basis of future advantages, and therefore a moderate increase of the *present state* of the trade has been preferred to the larger estimates of anticipated increase, which experience of similar cases would have justified.

The Arrondissement of Charleroi contained in 1838, when the last detailed statistical report was presented to the King, 84 Coal Mines —the extent of surface conceded for Colliery operations was nearly 35,000 acres. The number of pits in full activity was 209; 48 steam engines, and 1217 horses were employed in the extraction of Coal, and 20 steam engines and 1188 horses were used for draining the mines. The number of workmen was 8345, and the quantity of Coal extracted 724,359 tons of 1000 kilogrammes.

The statistical details contained in this report to the King are extremely elaborate, and afford a complete view of the mining and manufacturing industry of the country. The particulars of the Coal Mines comprise, besides many other points of information as to locality, &c., an account of the quantity of land conceded to each mine; the depth of the several pits; the number and designation of the beds of Coal susceptible of being worked; the thickness of the beds of Coal; the means of ventilation; the methods of extracting the Coal and system of drainage; the number of workmen; the quantity of Coal extracted; the quality and use of the products; the ways of communication for carrying off the produce; and occasional remarks of any peculiar circumstances of the mine under description.

The Collieries in the Coal Basin of Charleroi, including

the extension of it to Mons on the West, produced in 1842 3,059,183 tons of 1000 kilogrammes, or about 90,308 tons more than in 1841, and the total value was 1,148,350*l.* 2*s.* 8*d.* This, the first division of mines in the Province of Hainault, therefore produces more than three-fourths of the entire quantity of Coal annually raised in Belgium, which may be taken in round numbers at 4,000,000 tons of 1000 kilogrammes.

The important bearings of the Sambre and Meuse Railway on the Coal trade of Charleroi is shown by the following extracts from the Report of the Standing Committee to the General Meeting of the Members of the Coal Association of the Basin of Charleroi, held the 30th November, 1843.

"For six years the attention of your Committee has been fixed on this project (the Sambre and Meuse Railway); and it has suffered no opportunity to escape of soliciting the Government to take steps to ensure its execution; for we are bound to acknowledge that few projects for the improvement in the means of communication promise such important and undoubted advantages to the Coal Basin of Charleroi.

"This Railway will create, in a district now of comparatively little value, on account of its isolated position, a very considerable market, which will be of the more value to this Coal field, from being out of the reach of competition, and also because the description of Coal which will be consumed is precisely that for which, at present, there is the smallest demand.

"The Railway will, moreover, be of great benefit to the Charleroi Basin in another point of view; it will enable us to command again the markets which we formerly possessed exclusively, viz. the manufactories of Sedan, Rhetel, Rheims, and the Iron works of the Ardennes.

"It will facilitate the supply of Timber required for Mining purposes, by opening a direct communication between the Coal Basin, the Forests of Couvin, and the country round Chimay.

"It will enable the Iron Masters to obtain their raw materials cheaper, and with more regularity, restore to activity the numerous Works at present unemployed, and thus increase the consumption of that indispensable article, Coal."

In another part of the Report, the Committee, speaking of the Exportation of Coal into France, observe, that "the Basin of Charleroi possesses every quality of Coal, from the most bituminous to the poorest, from the most flaming Coal to that burning without any. It can furnish Coal adapted for every purpose."

An inspection of the statistical map which accompanies this statement will show at one glance the favourable position of the Sambre and Meuse Railway relatively to this the principal Coal field of Belgium. The disadvantages of bad roads in the districts near the Coal Mines greatly restrict the consumption of Coal; and, in a large portion of the country now about to be opened out, the expense of carriage is such as almost to amount to a prohibition of its use, especially for lime burning, where a cheap transport of the commoner sorts of Coal is absolutely essential to its being used at all. Notwithstanding these obvious disadvantages, and notwithstanding the detriment to manufacturing interests, which must ever arise from defective and expensive means of transporting Coal, the produce of the Mines now under consideration is equal to one-tenth of that enormous quantity of Coal which is annually produced by the whole of the Coal Mines in Great Britain.

The principal outlet from the Charleroi Coal Field is by the Rivers Sambre and Meuse, and the greatest probabi-

lities for the extension of its trade are in the districts to be traversed by the Railway and in the manufacturing towns of the Ardennes; hence the direction of the proposed line is such as naturally to command a large proportion of the Coal traffic of this important Mineral District.

COAL TRAFFIC

OF THE PROPOSED SAMBRE AND MEUSE RAILWAY.*

One of the chief features of the Mineral traffic of the proposed Railway, is the conveyance of coal from the Collieries of Charleroi to the River Meuse at Vireux. The saving which will be effected amounts to 4·50 francs (3*s.* 7*d.*) per ton, but this is far from being the most important advantage that will be gained. Rapidity of transport, uninterrupted communication, and the destruction of the entire monopoly both of transit and supply which now exists, would prove of incalculable benefit to the consumers in the manufacturing districts of the Ardennes.

The cost of carrying coal on the River Sambre going towards Namur is 40 centimes per ton per league,—the distance is 11 leagues, and the freight of a ton of Coals from Charleroi to Namur is therefore 4·40 francs. On the River Meuse, going towards Vireux, the rate of carriage is nearly the same as on the Sambre. The tolls on the Sambre from Charleroi to Namur amount to 19 centimes per ton per league. On the Meuse from Namur to the French Frontier, a distance of about 10½ leagues, there are two toll stations, at each of which 4 cents of the Pays Bas are collected per ton for the passage of and the return voyage if empty; and the tolls on the French Meuse, from

* The Belgian Tariff is invariably reckoned by the League of 5000 metres, which is 189 yards more than three English miles; therefore, for general purposes of comparison, the league may be reckoned as three English miles, the excess on each mile being only sixty-three yards, or one twenty-eighth part of a mile.

Givet to Vireux, amount to one franc nearly, viz. 16 kilometres at 0·06. The difficulty of ascending the Meuse to Givet, the small draft of water during a considerable portion of the year, and the liability to heavy floods during the remainder, more than compensate for the difference of tollage on the two rivers. The total cost of conveying a ton of coals, therefore, from Charleroi to Vireux, including the boatman's profit, and the usual incidental expenses and repairs, is as follows:

From Charleroi to Namur on the Sambre, navigation tolls	2·09	
Sundry incidental expenses . .	1·92	
Boatmen's profit	39	
	——	4·40
From Namur to Vireux on the Meuse, navigation tolls to Givet . .	30	
Sundry incidental expenses and repairs, ditto	5·00	
Boatmen's profit, ditto . . .	70	
	——	6·00
		10·40
The cost of conveying a ton of coals by Railway from the Sambre near Charleroi, to the Meuse at Vireux		5·90
Saving 4·50 francs, or 3*s.* 7*d.*		4·50

The voyage from Charleroi to Namur occupies two days, and from Namur to Givet from four to five days are required, that is, if they are able to proceed without meeting the serious interruptions which frequently occur, and which render this part of the river unnavigable a great portion of the year; whereas the journey by the Railway to Vireux will not exceed three or four hours, and two days will at all times suffice to convey the coal from

thence to Charleville, Mezières, Sedan, and the Canal of the Ardennes.

The average price of all the qualities of coal sold at the Collieries of Charleroi is 10·56 francs, or say 11 francs; the carriage on the Railway to Vireux amounts to 6 francs; and the cost on the French Meuse from Vireux to Mezières is 5 francs; which, with 1 franc per ton expenses at Vireux, amounts to 23 francs per ton at Mezières; and the further cost to Sedan is 2 francs, making the price of coal 25 francs (or about £1 sterling), delivered at Sedan. It is now sold there at an average price of 42 francs (£1 : 13*s.* 7*d.*) per ton; and so complete is the existing monopoly and occasional scarcity caused by an irregular supply, that M. Charles Gridaine, (son of the present French Minister of Commerce, and an eminent French manufacturer at Sedan), states that within the last two years he had for several weeks paid as high as 70 francs (£2 : 16*s.* 0*d.*) per ton for coals for his steam engines. At Rheims and other parts of the interior of the country, the price of coal, as stated in the letter of M. Sauvage,* amounts to 60 (£2 : 8*s.* 0*d.*) francs; at Chalons the price is 70 francs. The saving effected by means of the less cost, and greater regularity and certainty of supply at all times, by means of the proposed Railway, would therefore have a far more important influence on the consumption of coal in the Ardennes, than the mere difference of cost between Charleroi and Vireux. And it must be borne in mind that no difficulty whatever exists in the navigation of that part of the Meuse on which the coal would be carried, viz. from Vireux to the Canal of the Ardennes, Sedan, &c. &c.

It is obvious, therefore, that the saving of distance, of time, and of expense, are such as to leave no doubt of the Sambre and Meuse Railway superseding the navigation of

* 26th October, 1843. See page 67.

these rivers as the means of transporting coal to France. To every one acquainted with the effect of economy of time and money in commanding the Traffic of a District, it is only requisite to call attention to it by referring to the position of these two Lines of Conveyance: the one by Railway being nearly direct, of easy gradients worked by locomotive power throughout, a moderate rate of speed sufficing for the conveyance of minerals, and, what is most important, comprising the elements of traffic in both directions in nearly equal proportions; the other, almost twice the length, slow, uncertain, and subject to interruption, and much more expensive. From a careful examination of the whole District; from the opinion universally entertained by the best informed official persons resident in it and in the neighbouring parts of France; from the concurrent testimony of the Engineers of the Belgian Government, who have rigidly investigated this and other points relating to the traffic; from the opinion and statistical details so ably given by M. Sauvage, and from the facts and figures which have been detailed, it is quite clear that the transference of the Transport of Coal to France will form a material item in the Mineral Traffic on the Railway.

Extended examinations of the department of the Ardennes, and of manufacturing Towns of Charleville, Mezières and Sedan, I have fully shown the advantages which the Sambre and Meuse Railway cannot fail to afford. It is scarcely possible to suppose that so material a reduction in price, arising from diminished cost of conveyance, and from the destruction of the monopoly which now exists, added to constant facility of obtaining supplies, would not increase the consumption. This demand, by imparting fresh vitality to the extensive Coal Mines of Charleroi, would reduce the cost of working

Coal, and probably therefore effect a further reduction in price. The quantity now exported to France by the present expensive means of transport amounts to 100,000 tons, and it may be reasonably anticipated that this quantity will be very materially increased. To estimate that it would even be doubled would not exceed the limits of reasonable expectation; and M. Sauvage confidently estimates that in five years it will be doubled.

The following Letters (already referred to) from Monsieur Sauvage, Government Mining Engineer of the Departments of the Ardennes and the Meuse, and Author of "The Mineralogical and Geological Statistics of the Department of the Ardennes," contain much valuable information connected with the subject of the extension of mineral traffic by means of increased facilities of communication with the Ardennes:—

"Mezières, 26th October, 1843.

"Sir,—I take the earliest opportunity of replying to the letter you did me the honour to address to me, and to give you the information you require.

"1st. It appears from the official returns of the Customs, that the following quantities of Belgian Coal were imported into the Department of the Ardennes in 1842:—

	Coal.	Coke.
Through the Customs at Rocroi, by land ..	1,453,434 kilos.	34,700 kilos.
,, ,, Givet, by the Meuse	59,930,800	308,575
,, ,, by land	54,750	
Total	61,438,984	343,275

"2d. The consumption of Coal has increased greatly within the last ten years, and is still going on, as you will see by the

following extracts from the Reports of the Engineers appointed to improve the navigation of the Meuse:—

"Quantity of Coal imported into the Ardennes by the Meuse,

In the years	1831, 1832 and 1833,	average	40,000 tons.
Ditto	1834, 1835 and 1836	..	50,000 „
Ditto	1837, 1838 and 1839	..	59,000 „
Ditto	1840, 1841 and 1842	..	67,500 „

"The year 1842 was one of great drought; the Meuse was almost without water, and the importation of Coal was below the quantity required. In the first six months of 1843, the quantity of Coal and Coke imported amounts to 55,400 tons. In 1841, which was an ordinary year in point of drought, there were 43,700 tons imported in the first five months. From these proportions, therefore, it is fair to presume that the quantity imported in 1843 will reach 100,000 tons. At all events the consumption has doubled itself from 1831 to 1841, and every triennial period has witnessed an increase of 10,000 tons annually."

"The price of Coal may be taken at an average of 42 francs (1*l.* 13*s.* 6*d.*) in the Department of the Ardennes; that is the price at Sedan; at Charleville it is 38 to 40 francs."

"3rd. It is very difficult to form an accurate opinion of the increase of consumption consequent upon a reduction in the price of carriage; it usually exceeds all expectation, more especially in an article like Coal, the uses of which are multiplying daily. It is also to be observed, that the improvements effected in the last few years in the navigation of the Meuse have reduced the rate of carriage between Givet and Sedan. It remains for the Railway from Charleroi to Vireux to complete the communication between Charleroi and the Departments of the Meuse, the Marne, and the Ardennes, and to give full effect to the improvements made in the River Meuse on the French territory. The Sambre and Meuse Railway is the more necessary, as the Belgian Government does not seem disposed to effect any improvement in the river below Givet."

" If the Coal of Charleroi could be delivered at Vireux at 20 francs, which appears possible, it would cost at Sedan from 28 to 30 francs instead of 42 and even 45 francs. The former price is that of the Prussian Coal at Metz; and the increase of the consumption of Coal in the Department of the Moselle, owing to the improved modes of communication, is a matter of notoriety.*"

" When the plan presented to the French Government by its Engineers, and now approved of, for canalising the Meuse from Sedan to Void, is carried into execution, the Belgian Coal will penetrate very far into the Department of the Meuse, to Verdun, and even beyond. In another direction, you have the Canal of the Ardennes; and again, the Canal of the Aisne and Marne, now in progress, and which will shortly connect the towns of Rheims and Chalons, when Belgian Coal may be sold at reasonable prices, whereas they are now sold at exorbitant cost, viz. 60 francs at Rheims, and 70 francs at Chalons."

" Belgian Coal would therefore undoubtedly supply Chalons, and even reach Vitry, where it would compete successfully with the Coal of the Loire, which costs there 60 francs the ton."

" The consumption of Coal at Rhetel does not exceed 1200 tons, Rheims burns about 10,000, all of which does not come through the Ardennes; a portion goes by the Oise to Lafère, and from thence to Rheims. The consumption in this district would increase rapidly."

" Owing to the high price of Coal, the proportion that passes through the Department of the Ardennes for that of the Marne is far from sufficient to supply the wants of the trade of these districts. Thus the Departments of Marne, the Aisne and the Meuse collectively do not consume more than from 12,000 to 15,000 tons, or one-fifth of the quantity hitherto imported by Rocroi and Givet."

* Petiet and Flatchat's Tables, in their Pamphlet on the proposed Railway from Metz to Sarrebruck, state the importation into France to have been in 1827, 50,000 tons; in 1837, 100,000; in 1842, 150,000; and in 1843, 175,000.

" Coal for domestic purposes is but little used, notwithstanding the high price of wood. The making of Lime, Tiles and Bricks is still carried on with wood. All these would use Coal, if at a moderate rate, and increase considerably and rapidly beyond a doubt."

" It is difficult to say what the consumption of Coal for domestic purposes would be in large towns, such as Sedan and Charleville; the only criterion that can be taken is the consumption of towns having nearly the same population,* and where Coal may be had from 25 francs to 28 francs the ton. The present quantity, which does not now exceed 2000 tons, would, at the above prices, soon increase tenfold."

" The same observation will apply to the quantity of Coal used for making Lime, Bricks, Tiles, &c.; the quantity now consumed is about 6000 or 7000 tons, it would at a reduced price soon reach 10,000 to 12,000."

" It may be a matter of surprise, perhaps, that the consumption of Coal in the Ardennes has not hitherto been larger, situated as the Department is on the very frontier of Belgium, and possessing the means of water carriage. This must be attributed to the difficulty of the navigation (now partly overcome), to the monopoly exercised by the boatmen and parties engaged in the Coal Trade; in short, to an unhealthy state of things, which cannot continue to exist. I consider the importation of Coal in its infancy, and the execution of the Railway will, in my opinion, change entirely the nature of the Trade, and produce more important results than is generally imagined."

" I think I am therefore quite under the mark, in stating that, within five years after the opening of the Railway, the quantity of Coal imported would be doubled, *i. e.* would reach 200,000 tons per annum."

" 4th. The Iron Trade of the Ardennes competes with great difficulty against that of the Upper Marne, where the Iron

* Sedan contains 14,000 inhabitants; Mezières, 5000; Charleville, 8000; Rhetel, 7000; Rheims, 40,000; Chalons, 13,000; Vitry, 7000.

Ores are at a low price; a reduction in the price of Coal in the Ardennes would render the competition easier, and open the Paris markets to our manufactures. We have the advantage in point of geographical position, and it is unquestionable that a *slight* reduction in the price of Coal would enable the Ardennes to extend its trade very considerably."

"The number of Blast Iron furnaces in the Ardennes is 30, producing about 6000 tons of Pig Iron. Now, supposing the price of Coke to be reduced, and the half of the Pig Iron to be made with that fuel (and I am understating it), every ton of Iron would require 1½ ton of Coke, it would therefore require 4500 tons of Coke instead of the 300 or 400 tons now consumed. Moreover the reduction in Coke would enable the foundries to extend their business, which, even under present circumstances, they are doing at Sedan, Rhetel, and even at Rheims. I wish to point out to you, that, even with the present high rates of carriage, some founders have found it to their interest to use Belgian Pig Iron, and were the price of it reduced, the foundry branch of the Iron Trade would become a very considerable outlet for the article."

"In 1842, 1043 tons of Belgian Pig Iron were imported. I have already observed that this quantity is on the increase,* and cannot fail to continue, more particularly when the advantages the Belgian Ironmasters themselves will derive from the making of the Railway enables them to lower the price of Pig Iron. I can positively assert, that very lately a founder at Sedan purchased Belgian Pig Iron at 140 francs, delivered at Sedan, the price of the article being here 150 and 160 francs. The duty is 10 francs the ton, and the carriage may be reckoned at 0·06 francs per ton per kilometre."

"5th. Belgian Iron Ores are not used at present in the Ardennes; they would cost too high a price. Owing to the goodness of quality, and there being few of the same kind here,

* The returns for 1843 show 2296 tons.

our Ironmasters would consume a very considerable quantity of them, provided they could be delivered at Charleville and Sedan at 15 to 18 francs the ton. It would be from 8,000 to 10,000 tons."

" 6th. The present Prices of Pig and Wrought Iron at Charleville are—

		Francs per ton.
Strong Iron	(Charcoal) .	190 to 200
Common Iron		160
Tender Iron		150
Large Bar Iron . . .	(Charcoal) .	400 to 440
Do. do. . . .	(Coke) . .	320
Sheet Iron, Strong . .	(Charcoal) .	690
Do. do. . . .	(Coke) . .	590
Various Kinds . . .	(Charcoal) .	610 to 640
Do. do. . . .	(Coke) . .	510 to 530
Split Iron, Strong . .	(Charcoal) .	495 to 510
Do. do. Middling	(Charcoal) .	465 to 470
Do. do. . . .	(Coke) . .	350 to 355
Do. do. Tender .	(Coke) . .	320 to 340

" 7th. The Prices of Wood and Charcoal have greatly increased of late years.* "

" In 1815 the stere of forge wood (in the forest) cost 1 franc 70 c.; the ton of charcoal at the kiln cost 33 francs.

In 1820 the stere cost	2 francs	—The Charcoal	40 francs
In 1825	„	3·50	„	63·50
In 1830	„	3·75	„	67·50
In 1835	„	3·60	„	64·50
In 1840, 41, and 42	3·75 to 4	„	65 to 70

" In 1815 the stere of fire wood (domestic), which cost 4·25,

* Mr. Sauvage, in his work on the Geology and Statistics of the Ardennes, states, that to supply the Iron Trade of the Department alone, 3500 hectares, or 8753 acres, of Forest Lands are cleared annually.

rose in 1822 to 6·50; in 1822 to 7 francs, and is now worth from 6·50 to 7 francs."

" Accept, Sir, the assurance of my distinguished regard,

" The Engineer of the Mines of the Departments of the Ardennes and the Meuse,

" C. SAUVAGE."

" To THOS. SOPWITH, Esq., Civil Engineer,
Hotel des Pays Bas, Charleroi."

" Mezières, 29th March, 1844.

" Sir,—In compliance with your request, I have the honour to transmit you the returns of Coal, Coke and Pig Iron imported into the Department of the Ardennes in 1843, received from the Director of the Customs at Charleville, the correctness of which I beg to certify.

" There has been imported into the Department of the Ardennes from Belgium, during the year 1843—

	Coal.	Coke.
" By land, through the Customs at Rocroi	1,013,900 kilos.	40,950 kilos.
By the Meuse ,, at Givet .	87,501,900	404,350
Total	88,515,800	445,300

" General total of Coal and Coke 88,961,100 kilos. or 89,000 tons nearly.
Of *Belgian* Pig Iron..... 2,295,919 ,, or 2,296 ,,

" You must bear in mind, that the quantities as entered by the Customs employés are under rather than over the real weight; the quantity of Coal imported therefore may, without any exaggeration, be taken at 100,000 tons. Moreover, you must recollect the Iron Trade of the Ardennes has been much depressed in 1843."

" I am quite at your service for any information I can furnish you with,

" And believe me, Sir, your most obedient servant,

" C. SAUVAGE,

" Mining Engineer of the Departments of the Ardennes and the Meuse."

" THOS. SOPWITH, Esq., Civil Engineer,
Newcastle-upon-Tyne."

The Sambre and Meuse Company, in their Estimates of Traffic, limit their anticipations of increase to 40 per cent., which is fully borne out by the circumstances brought under their observation, and by the experience of similar cases. It is a fact incontestibly proved by experience, that the cheapness of Coal regulates the *quantity* consumed; and hence the *cost* of Coal per family does not vary so much as the price per Ton would appear to indicate. In reducing the price of Coal per Ton in the Ardennes, therefore, it is consistent with experience to anticipate that the parties now using Coal would use it more liberally, and there is no doubt that Coal would to a great extent supersede the use of Wood, the price of which has been nearly doubled since 1815. These considerations alone far more than justify an anticipated increase of 40 per cent. on the present consumption of the Ardennes. Again, it is well known that the extent of country over which the use of Coal prevails is dependant on its price. It would be unnecessary to offer these illustrations of what must appear so obvious, were it not desirable to show that no visionary anticipations have been formed, and that the reasons for a contemplated increase are such as fully to justify the estimate of Coal Traffic under this head at 140,000 tons, which carried 12·40 leagues, at 0·475 per league, amounts to £32,984.

The quantity of Coal used by Manufacturers on the Line, on an average of the last seven years, is ascertained, by authentic returns, to amount to 55,557 Tons. If we take into account the badness of the Roads (many of them wholly impassable in Winter), the necessity of laying in a Winter store, the high price of Carriage, and the contiguity of extensive Forests, now almost inaccessible, but to which a great additional value, increasing the cost of Timber fuel, will be given by the Railway; and compare with these the cheapness of a Railway Conveyance, brought to almost the very doors of the Manufactories, the stimulus given to Trade by the cheapness of Fuel and by cheapness of transporting Manufactured Goods, an addition of one-third may be safely anticipated in this department of the Coal Trade, making 74,102 Tons, the Carriage of which, calculated with reference to the several Distances, amounts to £3412 : 11*s.* 2*d.*

The use of Coal for domestic purposes is in many parts of the district almost wholly prohibited by the present cost of conveyance and uncertainty of supply. A glance at the Map will show that the Railway intersects a country, a great part of which is now wholly unapproached by good Roads; and the population of the Cantons, and of the Towns and Villages, figured on the Map, point out more forcibly than any reasoning the value of the facility which the Railway will afford for conveying Coal. Taking the average quantity per inhabitant used throughout Belgium, as derived from the following Table, published in the General Statistics of the Kingdom, we have 567 kilogrammes per inhabitant.

	Kilogrammes.
Antwerp	475·40
Brabant	510·01
Flanders, W.	286·03

	Kilogrammes.
Flanders, E.	545·52
Hainault	470·96
Leige	757·35
Limbourg	699·21
Luxembourg (no return.)	
Namur	792·40
	8)4537·15
	567

Taking the population of the Cantons* immediately adjoining the Railway, and wholly omitting the more northern portion of the Line, we have 71,118 inhabitants, at 567 kilogrammes each, or 40,323 tons, and taking a medium distance of seven leagues at 0·475, the carriage of Coal for consumption for domestic purposes will produce £5363.

The application of Lime as a manure in the lands near the proposed Railway is greatly limited, and in a great measure wholly prevented, by the expense of procuring Coal. When the Agricultural industry of the Belgians is considered,—the avidity with which they apply all attainable means to the improvement of land, and the zeal and energy which characterizes most of the principal Landowners, there is no doubt that the consumption of Coal for burning Lime would be very considerable. On this point the testimony of the Count de Baillet Latour, and of M. Dupont of Walcourt, both of them very large landed proprietors, is decisive. The following calculation is based on the experience of parties residing in the District:

* Beaumont	14,234	Couvin	13,853
Walcourt	13,290	Chimai	14,054
Florennes	7,451		71,118
Philippville	8,236		

There are about 105,000 acres of arable land in the Arrondissement of Philippeville, and the quantity of Coal required for burning the Lime which would probably be applied, amounts to 41,000 tons, which carried on the Railway eight leagues, at fifty centimes per ton per league, amounts to 164,000 frs. = £6560. A similar calculation for the four Communes of Thuin, which lie near to the Railway; for seven Communes of the Canton of Beaumont, and for seventeen Communes of the Canton of Chimay, gives the aggregate amount of £2047, which with Philippeville makes £8607. Although large quantities of Lime would undoubtedly be consumed, one-fourth only of this amount has been assumed, viz. £2152.

The quantity of Coal used for refining Salt, making Bricks, and other minor purposes, would also be probably increased; but as the present amount is not large, these items are not included in the Traffic Tables, for the broad and obvious sources of Traffic being such as to afford a solid prospect, it is unnecessary to have recourse to large anticipations of increase on the one hand, or to trifling details on the other. A much greater demand for Coal would arise for the purpose of draining Iron Mines, most of which are now abandoned as soon as Steam-engine Drainage becomes requisite; but no calculation of such increase has been made in the estimate of Traffic.

IRON MINES.

The central portion of the district of the Sambre and the Meuse, through which the intended Railway is to pass, contains very numerous and extensive deposits of Iron Ore, extending in a nearly east and west direction, coinciding with that of the strata generally, and may often be traced for several miles in a nearly straight line by the laminated schists, which appear at the surface.

By far the greater part of the Iron Mines which are now worked are carried on by hand labour, and without engines for pumping the water. So great is the number of places where the Iron ore is obtained, that it would be difficult by any description to convey a correct idea of the extent and value of these rich mineral deposits. As soon as a work is stopped by water, the miners open a new excavation; and hence steam-engine drainage is at present seldom resorted to.

In the Arrondissement of Charleroi, and Province of Namur, the number of concessions or grants for working Iron Mines, in the years 1836 to 1838 inclusive, was twenty-three. In 1836, there were 746 places of "exploitation," or workings in Iron Mines open from the surface; in 1837, there were 765; and in 1838, only 447, owing to the great commercial fluctuations which then took place, and which for a time seriously affected every branch of the national industry. In the same years the number of subterranean Iron Mines was as follows: In 1836, 215 mines; in 1837, 315 mines; and in 1838 only thirty-six mines. The number of miners employed in both descriptions of mines was in 1836, 3115; in 1837, 3679; and in 1838, 1435.

The quantities of Iron Ore obtained were as follows:—

	In Charleroi.	In Namur.
1836	39,981 tons.	490,612 tons.
1837	74,203 do.	495,619 do.
1838	3,826 do.	208,046 do.

The total quantities of Iron Ore raised in the whole of Belgium, in these three years, were as follows:—

	In Belgium.	In Charleroi and Namur.
1836	636,955	530,593
1837	685,573	569,822
1838	334,838	211,872

From which it appears, that nearly three fourths of all the Iron Ore obtained during these three years in the whole of Belgium were obtained from Charleroi and Namur; and by far the largest proportion of the ore worked in these provinces was obtained from Mines in the immediate locality of the proposed Railway, the short lateral branches of which, as may be seen by the map, penetrate into the very heart of the chief Iron Mining Districts.

In 1842, there were in the Arrondissement of Charleroi 10 blast furnaces at work, and 12 blown out: 4 new furnaces being constructed, made a total of 26. The number of Steam-engines was 25, equal to 1354 horse power, and of Coke ovens, 627. The 10 blast furnaces at work consumed 119,710 tons of washed Ore, 52,719 tons of Limestone, and 133,225 tons of Coal, producing 41,240 tons of Pig Iron, worth on the spot upwards of 160,000*l.* Of 8 charcoal furnaces, 2 only were at work in 1842; 7 of them employ water power, the other a steam-engine of 20 horse power. The furnaces at work consumed 4985 tons of washed Ore, 844 tons of Limestone, and produced 1695 tons of Pig Iron, value 9835*l.*

These details, while they exhibit the mineral capabilities of the District, and the depressed state of the Iron trade consequent on the heavy expenses of transporting Coal and Iron Ore, strongly point out the advantages of a Railway Communication, which alone can impart vitality to those operations, for which the materials are so largely provided in the various strata of the District of the Sambre and the Meuse.

The workmen receive from 2½ to 4 francs (2*s.* to 3*s.* 2*d.*), according to depth and greater or less facilities for working, for bringing to the surface a quantity called a "cense," which is a square heap measuring 7 feet 9 inches on each side, and 17 inches high, measured in the state in which

it comes from the mine, that is, mixed with clay, &c. It subsequently costs about 2*s.* for the first washing, and 1*s.* 3*d.* for the second. The weight of washed ore contained in a cense varies from 3000 to 3500 kilogrammes, or about from 3 tons to 3½ tons.

A great number of excavations for working Iron Ore are situated near Cour-sur-Heure, Thy-le-Chateau, Vogenée, Morialmé, Florennes, and other central parts of the District of the Sambre and the Meuse as shown on the Map; but no where are they in greater abundance, or more productive, than in the "Bois de Minières." This extraordinary mineral tract, whence the forest in and near which it is situated takes its name, is about 12 miles south of Charleroi. It furnishes a vast abundance of Iron Ores of excellent quality, which are conveyed through some parts of the forest by Tramways, and thence to Charleroi on the north, or to Couvin on the south, or to works between these places, all of them contiguous to the proposed Railway, but to which the only existing means of communication are the common roads. The cost of carriage, therefore, now bears a large proportion to the value of the ore; thus, for instance, in a contract made by M. Lucq, the grantee of the Bois de Minières, for the delivery of ore at the Iron Works at Couvin, the price was fixed at 65 francs (2*l.* 12*s.*) per "cense," 40 francs (1*l.* 12*s.*) being the price of the ore, and 25 francs (1*l.*) the cost of conveyance. The distance is about 5 leagues, which is therefore at the rate of 5 francs per league, or 1 franc for 1000 metres (1 kilometre), or about 1 franc 60 cent., nearly 1*s.* 4*d.*, for carrying a cense of say 3 tons (3048 kilogrammes) an English mile, rather more than 5*d.* per ton per mile.

The average cost of the ores contained near Morialmé, Fraire, Yves, and Florennes, is about 33 francs, or 1*l.* 6*s.* 6*d.*, per cense; the carriage of these ores a distance of 6 leagues

was 30 francs (1*l.* 4*s.*); in which case the value of the ore, and the conveyance of it, amount to nearly the same sum. M. Lucq communicated the following particulars relating to the mineral district of which he is the grantee.

"BRUSSELS, 28th October, 1843.

"SIR,

"IN reply to your Letter, I have the pleasure of communicating what information I possess on the subject of the Iron Mines of the district of the Sambre and Meuse.

"Iron Ore has been extracted in Belgium from a very remote period. In many parts of the district 'Entre Sambre and Meuse,' more particularly about Couvin and the Bois des Minières, immense heaps of Scoria are met with, the origin of which is quite unknown. At the former place there are iron forges which date from the time of the Princes Counts of Couvin, a family which has now been extinct for more than seven centuries.

"Under the dominion of the Spaniards and Austrians in Belgium, large quantities of Iron Ore were extracted from the Bois des Minières, on account of the Abbey of Florennes, to whom the property then belonged.

"During the time of Napoleon and up to 1814, large quantities were also extracted. In the reign of King William of Holland, the workings were stopped on account of the great excavations made at the surface, these are now become large ponds of considerable depth.

"In 1827, when the Dutch Government disposed of the Public Domains, Mr. Hanonnet Gendarme, who was then the Proprietor of the Couvin Iron Works, purchased the Bois des Minières, and commenced very extensive workings. A Steam Engine for draining the Mines was erected, the first applied to that purpose in Belgium, with the exception of one erected at the Suédoise Mine near Couvin, belonging to the same party.

"In 1835, the sale of the Bois des Minières was declared null and void, the payments stipulated not having been made in due

time; the workings were suspended, and the Government again became Proprietors of the Mines.

"In 1839, I obtained the Grant of the Bois des Minières, upon condition of paying a royalty of 5 centimes per cense of washed Ore. Since then the works have been carried on with great activity. A second Steam Engine has been erected, and the average quantity of Ore extracted is from 500 to 600 censes per month, each cense weighing from 3000 to 3500 kilos. The Ore extracted from two places weighs as much as 4000 kilos the cense. The ores are found in beds, in pockets, or in veins extending in an East and West direction. Pockets or deposits are the most frequently met with in the Sambre and Meuse district; in many places they are of great thickness, viz. at Morialmé, Fraire, St. Aubin, the Bois des Minières, and Florennes. In some spots there have been from 25 to 30 feet of solid Ores extracted without reaching the bottom, but the drainage has not yet been effected lower. It must also be borne in mind, that for many centuries vast quantities of Ore have been extracted nearer the surface, which was always abandoned as soon as water was met with. It is impossible to form any opinion of the quantity of Ore contained in these pockets or deposits, or when the end of them will be reached. I am acquainted with some from whence enormous quantities have been extracted—for instance, that called the "Croix de Fer," in the Minières, the surface has sunk more than 30 feet for several hectares in extent, nevertheless every year many thousand waggon loads are procured.

"Since the erection of Steam Engines by Monsieur Hanonnet Gendarme, at Couvin and the Bois des Minières, a very powerful one has been placed at Jamiolle, near Philippville, by the Société de Couillet, another by the Association of Iron Masters in the Bois du Comte de Bryas, which adjoins that of the Minières, and two others have been erected at Morialmé.

"The combined operations of these Engines have effected a drainage of from 100 to 150 feet, without reaching the bottom of the mineral deposits.

"The Engine at the Suédoise Mine near Couvin was erected

for the purpose of enabling the miners to follow a vein of Ore, and a depth of 200 feet was reached, when the works were suspended on account of the Revolution; since which time no further progress has been made, principally owing to the high price of the Carriage of Coal for the Engine. Mr. Pochet, of Chimay, has also erected an Engine near Olloy, at a place called the Roche Madou. I am not aware what depth has been reached. Another one is being placed at Petigny, in the expectation of the Sambre and Meuse Railway being made.

" The present mode of conveying the Ores from the Mines to the furnaces is by waggons. The distances vary from 1 to 5 and 6 leagues, and farther for the District of Chimay.

" Considerable quantities go from Charleroi by the Sambre to Liège. Were the Railway made they would be conveyed upon it as far as Marchienne.

" I am not aware that any work exists giving accurate analyses of Iron Ores of Belgium. As far as those which I have made go, I have found the ores of the Sambre and Meuse to be yellow oxides, containing a small proportion of the Peroxide of Manganese, some Alumina, with Silica and Quartz in powder, sometimes mixed, sometimes combined. These last are more prevalent in the Ores in the Canton of Couvin. A great portion of these substances go off in the washing and sifting. Some of the Ores near Philippville contain portions of Sulphur and Arsenic, but they have hitherto been little used. The other descriptions are too abundant, and roasting would be too expensive, from the cost of conveying Coal.

" Any further information I can give is at your service, and I beg you to accept the assurance of my esteem.

(Signed) A. LUCQ,
Grantee of the Bois des Minières."

" Monsr. SOPWITH,
Hôtel des Pays Bas,
à Charleroi."

In the southern part of the District opened out by the Sambre and Meuse Railway, are numerous and extensive

deposits of Iron ore, extending in the direction of Frasne, Nismes, Olloy, Vierve, and Treigne. It is stated, in a note on the Mineral Map of Belgium, that the superior quality of the ores has caused them to be so extensively worked, that these Deposits are in a great measure exhausted. A similar opinion was expressed relative to the mine called la Suédoise at Couvin, but the proprietor persevered, and obtained large quantities of ore from deep excavations. (The Iron made from some of the ores in this District is of so fine a quality, that beautiful medals have been cast with it from the furnace.) One of the cavities is 150 feet long, and near it are shafts which, at 20 metres depth, are stopped by water, but by Steam-engine Drainage there is every reason to suppose that a vast abundance of valuable Mineral yet remains, as has been found to be the case in several Iron mines, which, after being abandoned on account of the quantity of water, have been profitably worked to a great extent by Steam-engines. Owing to the badness of the roads, the cost of conveyance here is even greater than that already described from the Bois de Minières.

The opinion of the best informed persons living in this part of the country, derived from long experience of Mining, and an intimate knowledge of the nature and extent of the Iron Deposits, is, that there are no grounds for apprehension on the score of Mineral produce yet to be obtained. The economic use of the Steam-engine is now however totally precluded by the expense of procuring Coal.

Whatever may be the state of exhaustion in this zone of deposits, it is quite certain that, when viewed generally, the District of the Sambre and Meuse is rich in deposits of Iron Ore, which has as yet been worked only to a very limited depth, and which unquestionably afford the means of a continued supply far beyond any period that can affect the prosperity of the Railway.

TRAFFIC IN IRON ORES, AND PIG AND WROUGHT IRON.

The following Table exhibits the Average of the last Seven Years' Carriage of Iron Ores, as derived from the Annual Statistical Returns, regularly made by the Mining Engineers, and the results of which are published in the Reports of the Provincial Councils, confirmed also by personal inquiry of Iron Masters and others, acquainted with the details, residing in the District. They are conveyed from the various Mines of Fraire, Jamiolle, Morialmé, the Bois des Minières, &c. &c. &c. to the Smelting Establishments in the District and at Charleroi; and from the Iron Works of Bossu en Fagnes to various places.

Weight in Tons.	Distance in Leagues conveyed upon Line.	Toll per Ton per League.	Amount in Francs.
16,000	3	0·425	22,800
3,145	3·20	0·425	4,277
7,063	6·50	0·425	19,511·54
700	6·20	0·475	2,061·50
270	7·50	0·475	961·88
270	7·60	0·475	974·70
3,420	8·40	0·475	13,631·80
3,150	8·50	0·475	11,628 1,090·13
2,880	9·40	0·475	12,858
600	0·50	0·4462	133·87
2,000	0·80	0·4462	714
2,000	1	0·4462	892·15
1,600	1·40	0·4462	999·60
3,100	1·50	0·4462	2,075·05
4,800	2	0·4462	4,284
1,300	2·40	0·4462	1,392·30
1,454	3	0·4462	1,853·85
20,000	3·20	0·4462	27,200
70,094	6·50	0·4462	193,634·68
700	0·60 to 1·50	0·575	633·94
			1,936·58
			325,544·92
			Or, £13,021 : 16 : 0.

This Table gives the quantities of Iron Ore obtained from the various mines and conveyed to certain Iron works, which from their respective positions cannot avoid using the Railway, leaving the assumption that Ores from other Mines, not immediately contiguous to it, would still be conveyed by the present expensive means of Waggons on the common roads. The above Table, based on the average of the actually existing traffic of the last seven years, is a satisfactory evidence of the abundance of Minerals; but it would be contrary to all analogy to suppose that a reduction of two-thirds the present cost of conveyance would not lead to a greater consumption, especially when with this saving a similar economy in the cost of Coal could be effected. The increased facility of transport to France would also lead to a consumption in the Ardennes. M. Sauvage, in his letter of October 26, 1843, says "Belgian Ores are not used at present in the Ardennes; they would cost too high a price. Owing to the goodness of quality, and there being few of the same kind here, our Iron Masters would consume a very considerable quantity of them, provided they could be delivered at Charleville and Sedan at 15 to 18 francs the ton. It would be from 8,000 to 10,000 tons."

The Railway Receipts would probably be increased, even if the quantity carried remained stationary. The best Ores are at the Southern extremity of the Line, the most extensive smelting establishments at the Northern. The latter have hitherto been almost prohibited from using the Ores of Nismes, Petigny, and Couvin, chiefly from the high rates of Carriage, and partly from the impossibility of keeping up a regular supply. It now costs 15 francs to convey a ton of Ore from Couvin to Charleroi, whereas by the Railway it will cost 5·22 francs. On the other hand, the works at the Southern end of the Line, in the

midst of the strong refractory Ores, would be greatly benefited by a more liberal mixture of those of the Northern and centre Mines. Coupled with a cheap supply of Ores and Coal, Couvin could manufacture Iron at a rate which would secure a great outlet in France, standing as she does almost on the borders. The Railway, therefore, instead of conveying Ores one, two, or three leagues, would convey many thousand tons six, seven, and eight leagues.

Under these circumstances, then, it is obvious that the actually existing traffic is no guide for the probable extent of it when a Railway is completed. What the increase will prove to be it is impossible to estimate with certainty, nor to determine the modifications and changes, which will be introduced in this department, arising from a reduction of two-thirds cost of carriage on the conveyance of Ores an additional distance along the line, and a probable export to France; but Mr. Sopwith, after conferring with many of the most experienced persons in the district connected with the Iron Trade, and viewing the capabilities of increase of trade that evidently exist, considers that an addition of one-third to the amount of the existing traffic may be prudently relied upon, making £17,361.

The existing traffic of PIG and WROUGHT IRON is ascertained by accurate Statistical Returns made to Government, and from information obtained from the Proprietors of Iron Works, to be as follows, on the average of the last Seven Years. It is conveyed from the different Blast Furnaces to the Rolling Mills, Forges, &c. &c. in the district, to the interior of Belgium :—

Quantity in Tons.	Distance conveyed on Railway, in Leagues.	Toll per Ton per League.	Amount in Francs.	Amount Sterling.
330	0·80	0·425	117·81	
819	3	0·425	1,074·23	
8,734	4	0·425	14,847·80	
340	4·40	0·425	635·80	
3,304	5	0·425	7,021	
400	5·20	0·425	884	
1,994	6	0·425	5,084·70	
500	6·40	0·425	1,360	
200	0·50	0·4462	44·63	
430	1	0·4462	281·13	
245	1·50	0·4462	163·99	
234	2	0·4462	188·32	
660	2·40	0·4462	706·86	
350	9	0·475	1,506·25	
2,692	11	0·475	14,065·70	
193	3 80	0·575	421·71	
494	6	0·575	1,410·75	
21,920			49,814·68	£1,992,119

A very considerable increase may be confidently looked for in this Department, when, by the effect of the Railway, the cost of Pig Iron is reduced 20*s*. to 30*s*. per ton, and many of the furnaces, situated at a comparatively short distance from the Meuse, shall be able to send their produce into the Ardennes at a much lower rate than they now can do. The Belgian Pig Iron is daily becoming more indispensable to the Iron Masters of the Ardennes, who are almost precluded from manufacturing with Coke by the high price of that fuel: Charcoal has also risen more than one-half in price since 1815: the quality of the Belgian Iron is moreover superior. A more striking proof of their anxiety to obtain it cannot be stated than the fact of a deputation of them having a waited on the *Belgian Minister*, to solicit a reduction in the Canal and River tolls, and those of the Railway upon Pig Iron exported from Belgium into France; that some arrangement facilitating this branch of exportation will at no distant period be

brought about is almost certain; the measure is too necessary for the Trade of Belgium, and the wants of the several Departments of France in that direction, to be much longer delayed: as it is, 1043 tons only were imported in 1842, and 2295 tons in 1843.

M. Sauvage states that the number of Blast Iron Furnaces in the Ardennes using Coke is 30, producing about 6000 tons of Pig Iron; and adds, that, supposing the price of Coke to be reduced, and the half of the Pig Iron to be made with that fuel, (which is understating it,) every ton of Iron would require 1½ ton of Coke; it would therefore require 4500 tons of Coke, instead of the 300 or 400 tons now consumed. Moreover, the reduction in Coke would enable the Foundries to extend their business, which, even under present circumstances, they are doing at Sedan, Rhetel, and Rheims. Even with the present high rates of carriage, some founders have found it to their interest to use Belgian Pig Iron, and were the price of it reduced, the foundry branch of the Iron Trade would be greatly increased.

In 1842, 1043 tons of Belgian Pig Iron were imported; this quantity is on the increase, and M. Sauvage considers that it cannot fail to continue, more particularly if the advantages the Belgian Iron Masters themselves will derive from the making of the Railway enable them to lower the price of Pig Iron. He positively asserts that very lately a Founder at Sedan purchased Belgian Pig Iron at 140 francs, delivered at Sedan, the price of the article being at that place 150 and 160 francs. The duty is 40 francs the ton, and the carriage may be reckoned at 0·06 francs per ton per kilometre.

As the export trade to France is not included in the above estimate of existing Traffic, and as so great and obvious improvement, as a cheap intercourse between the Coal and Iron Mines, could not fail to produce an im-

portant influence on a trade where abundant demand exists;* and where the supply is prevented only by the cost of conveyance, which is to be reduced in no less than three of the chief elements of the Iron Trade—cheapness of ore, cheapness of fuel, and cheapness of conveyance—The existing traffic would be increased at least 50 per cent.; making under this head an amount of 2988*l.* 17*s.* 7*d.*

LEAD MINES.

The carboniferous or mountain limestone, which forms a prevailing feature of the country between the Sambre and Meuse, is the same geological formation, which, in England, is the seat of the most extensive and valuable lead mines, especially in Cumberland, Durham, Yorkshire, and Derbyshire. The hilly districts near the southern part of the proposed Railway, in general contour, denuded vallies, bold escarpments, and precipices of limestone, strongly resemble some of the northern mining districts of England; but no spirited exertions have been made either to discover mineral veins, or even to work, on a large scale, those which are too prominent at the surface to escape observation. There is a vein near the village of Treigne from which lead ore was procured a few years ago, and the same vein appears in a hill on the opposite side of the valley, indicating at once the direction in which trials might be made, and exhibiting that "strength of vein," as it is termed by miners, which renders it worthy of trial. Several specimens of Galena (Sulphuret of Lead, which is the most abundant ore of lead found in Great Britain) have been obtained from near Olloy. At Mazee, in winter time, the people frequently work Lead Ore from veins in the neigh-

* There are altogether in the Ardennes 38 blast furnaces, and 128 establishments for working Iron.

bourhood, and operations which were begun on a large scale, by a Company, a year or two prior to the Revolution, were given up on account of the political changes which affected the interests of the parties concerned. A concession or grant of 1200 hectares was made to four partners, one of whom was Mr. Cockerill, of Seraing, and another Mr. Mushet, of Coleford, one of the most experienced English metallurgists. After viewing the tract of ground, and the adit or level which had been commenced in order to work the veins of Lead,* Mr. Sopwith examined a plan on which the mineral veins were delineated, and the enterprise of these gentlemen confirmed the opinion he had entertained, that reasonable inducements for Lead Mining Adventure are presented in this and several other parts of the district. Lead Ore has also been found near Dourbe. Although no considerable mines are in operation, yet the effect of a Railway will probably be to awaken a spirit of adventure; especially as the conditions of the mineral grants made by Government are liberal and judicious.

This prospect, however, forms no part of the Estimated Traffic, which, as already stated, is strictly based on the actually existing materials for transport now furnished by the District. A close resemblance in the physical geography of the southern part of the Sambre and Meuse District to some of the most important Lead Mining Districts in England, and the satisfactory evidence of the existence of Lead veins in the immediate locality of

* This level has lately been resumed. It is 180 yards long, and has cost 1,200*l*. About 20 tons of Ore have been obtained. It required very little washing, and was sold for the following prices:—

Large size . .	15*l*.	4*s*.	per ton of 1000 kilogrammes.
Second size . .	12*l*.	16*s*.	do. do.
Small . . .	10*l*.	8*s*.	do. do.

the proposed Railway, seemed, however, to merit some notice in a general view of the Mineral Statistics of the District under consideration.

SLATE.

The Slate rocks of Belgium constitute the base of the formations containing Coal, Iron, and Lead, as already described. Owing to geological changes which have occurred subsequently to the deposition of these rocks, the same strata are brought repeatedly to the surface, so as to form saddles or elevations with hollows between: hence there are three bands or lines of direction in which the Slate rocks are presented at the surface, so as to be available for economic uses. The southern one is entirely in the District of the Ardennes; another, on the north, is chiefly in the Province of Brabant; the middle zone or band passes through the District of the Sambre and the Meuse.

The distinguished geologist already mentioned, J. J. D'Omalius D'Halloy, points out the strong resemblance of the Ardennes Slate formation to that of Wales, which had led him to assign to it a contemporaneous origin. Whether it belongs to Silurian or Devonian rocks is, however, of less moment than the ascertained value of the slates for commercial purposes, and this is fully evidenced by the great extent to which they are already worked, notwithstanding the existing disadvantages of transport.

The Report of the Commission appointed by the Belgian Government to inquire into the Nature and Value of Indigenous Materials (Commission des Matériaux Indigènes) contains much valuable information on the Slates of the District now under consideration. The essential qualities of good Slate are described, and a comparison instituted between those of Belgium and the Ardennes, with reference to their being homogeneous, of a firm and close grain and

polish, their hardness, tenacity and elasticity, &c. The Slates quarried at Fumay, which is about 8 miles from the Terminus of the proposed Railway at Vireux, have a violet shade, and are of excellent quality. The Report states, that many of the Belgian Slates, though different in colour, are equal in general good qualities to the Fumay Slate.

The Slate quarries at Oignie are nearly midway between Fumay and Couvin; they produced in 1842, 5440 tons; and M. Magis, who has made a careful survey and examination of the whole District on the part of the Belgian government, stated, that if a good Road was made to them, he has no doubt that the quantity would be doubled. This is only one of numerous illustrations that might be adduced to show how much the mineral riches of the District are lost for want of the means of transport. The Rock from whence the Slates at Oignie are quarried is above 26 feet thick, inclining to the south at an angle of 45°. The Slates produced are very handsome, and are now becoming very favourably known. They have been chiefly quarried from the upper part of the Rock, and the Authors of the Report anticipate that the lower beds may equal the best Fumay Slate. During part of the year 1840, 134,000 Slates per month were made, which, if continued, would produce more than 1½ millions per annum. The Slates are sold at 20 francs (16*s.*) for the red and grey kinds, and 18 francs (14*s.* 2*d.*) for the green Slate. They are conveyed by Waggons on bad cross-roads to Bruly, a distance of somewhat more than a league, and thence on the high roads to Namur and Hainault.

The Commissioners of Enquiry, M. Cauchy, Chief Engineer of Mines, M. Roget, Engineer in Chief "des Ponts et Chaussées," and Lieut.-Col. Dandelin, arrive at the following conclusions:—

1st. That Belgium possesses in itself a large number of

Slate Quarries, and is in this respect free from dependence on other Countries.

2nd. That most part of the Slates worked in the Province of Luxembourg and at Oignie may rival in goodness and beauty those of Fumay.

3rd. That though experience has not yet confirmed the durability of these new Slates as suitable for Works of great duration, yet until their qualities shall have been fully ascertained, the Commissioners can recommend the well-tried Slates of Herbeaumont, of Geripont, and of Viel Salm. And they recommend that the Government should encourage and regulate, by every means in its power, the working of Slates, which they consider will become an interesting branch of the national industry. The Report bears date April 10th, 1841.

At Rimogne, in the Ardennes, at a short distance from the Southern extremities of the proposed Railway, about 35 millions of Slate are produced annually, the present price of the Coal used at these Works is 34 francs (1*l.* 7*s.* 2*d.*) per ton. There are other Quarries in this part of the Country, the total produce of which amounts to nearly 60 millions of Slates per annum. M. Poulet, Comptroller of the Society of Couvin, states that the Slate Quarries of "Oignies," of "Cul des Sarts," and of the Croix de Hérésy, in the Commune of Bruly, require only a small portion of capital and good communications to supply a large quantity of Slates of good quality. He estimates the number which could very shortly be made at these Quarries at from 45,000 to 50,000 Slates every 24 hours, supposing they could be conveyed to the centre of consumption, viz. Mons, Brussels, Ghent, Antwerp, Louvain, and Malines, at prices which would enable them to compete with those of the Meuse and the Ardennes.

TRAFFIC IN SLATES.

The Slate Districts of Belgium, and of the immediately adjoining borders of the Ardennes, are at present worked to a considerable extent; and that portion of the present Traffic which would come upon the proposed Railway is ascertained to be as follows:

From the Quarries of Oignies, 468 tons, conveyed on the Line from Couvin to Marchiennes au Pont, a distance of 11 leagues, at 0·475 = 2,445·30.

Slates, which are now sent from Fumay down the Meuse to Namur, and from thence up the Sambre to Charleroi, on their way to Maubeuge and the North and North Western Districts of France, would, instead of this circuitous route, be sent directly across the country in transit from Vireux to Charleroi by the Railway. The quantity now sent amounts to 3885 tons, the carriage of which on the Railway 12·40 leagues, at 0·475, amounts to fr.22,882·65.

From Fumay, for consumption in Belgium, 2960 tons, carried 12·40 leagues, at 0·475=17,434·40, amounting in all to 42,762·35 francs, or £1,710 : 9*s*. 10*d*.

Such being the well authenticated account of the present Traffic, the great facility of conveyance, and consequent cheapness, would undoubtedly be the means of the Slate Districts being more extensively opened, as well as of producing a more extended sale; and reckoning this increase at 25 per cent. on £1,710 : 9*s*. 10*d*., the amount is £2,138.

BUILDING STONE.

Building Stone is furnished in great abundance in almost every part of the Sambre and Meuse District by the numerous thick beds of Limestone, which, owing to the undulations of the entire series of Rocks, are frequently presented at the surface, and consequently are quarried with

great facility; they furnish solid, durable, and in some cases, elegant Building Stone, many varieties being beautifully veined and hard enough to admit of being polished. Its abundance and cheapness are apparent from its almost universal application even to the commonest Building purposes, Cottages and Barns in retired Villages being entirely built with it. The appearance of these Limestones in Public Buildings, Bridges, &c. adds much to the effect of architectural design, by the sharpness of the angles and decision of form which the skilful Masons of the District give to this apparently unpromising material; and the neat and solid manner in which Cottages, Barns, &c. are built indicates the cheapness of labour. As to quantity, it is altogether inexhaustible, forming as it does the larger portion of the principal Rocks of the country. The following Government Contract prices of materials and of labour, furnished by Capt. Rolands, commanding the Engineer Corps at Charleroi, now engaged in the construction of extensive Works at the fortifications of that town, may be useful as an Index to the Estimates for a Railway which commences in the same locality.

A cubic metre of Ashlar stonework from the quarries situated on the banks of the Sambre, roughly worked with the chisel or picked without mouldings, but, including the placing, costs 60 francs (2*l.* 8*s.*), which is nearly equal to 1*l.* 16*s.* 10*d.* per cubic yard English.

The same stone finely worked with chisel and with straight mouldings, 75 francs per cubic metre, or about 2*l.* 5*s.* 7*d.* per cubic yard.

The cubic metre of rough stone masonry, with ordinary mortar, for foundations, 8·45 francs per metre,—about 5*s.* 3*d.* per cubic yard.

The cubic metre of brickwork (the bricks made in the

immediate neighbourhood), with common mortar, 12·80 francs per metre (7*s.* 10*d.* per cubic yard).

The cubic metre of common earth, excavated with the shovel, loaded on a wheelbarrow or on a waggon, including ramming down, 20 centimes, or 1½*d.* per cubic yard.

Each "stage" of a wheelbarrow is 30 metres on level ground (nearly 33 yards), and costs 1*d.*

The wages of a stonemason, joiner, or blacksmith are 2*s.* 5*d.* per diem. A bricklayer, plasterer, or carpenter, 2*s.* A mason's labourer, working 10 hours a-day, 1*s.* 4*d.*; and of a labourer employed in earthworks, and finding his own tools, 1*s.* 7*d.* The above prices include the contractor's profit.

In the central parts of the district of the Sambre and Meuse, labourers receive about 10*d.* a-day in winter, and 1*s.* 3*d.* in summer. Masons and carpenters have from 1*s.* 8*d.* to 2*s.* a-day.

The Sandstone rocks, generally speaking, are not well adapted for building purposes, and are therefore very little used, except for foundations or rough work. Bricks are sold at Marchiennes au Pont, where the Railway commences, and for a few miles up the Valley of the Heure, at 6½ francs (5*s.* 3*d.*) per 1000; at Walcourt at 8*s.*; at Couvin, 9*s.* 7*d.*; at Cul de Sarts, 12*s.*; the increase in price arising from the expense of carrying Coal to the greater distances. Clay for making bricks is abundant throughout the district.

MARBLE.

The country between the Sambre and the Meuse contains an inexhaustible supply of beautiful Marbles, which, though partially used in their several localities, are almost wholly shut out from the facilities which are requisite for an extensive trade. In many of the houses near the quarries are beautiful specimens of Marble employed in every

department,—in the floors, mantels, window-soles, tables, &c. At the principal Marble-works at Dinant, Rance, &c. a great many varieties of the marbles of the country are worked in various ornamental forms with great economy and taste. Mr. Sopwith examined several of the quarries whence these marbles are obtained, and procured specimens of the principal varieties, a duplicate series of which he has placed in the MUSEUM OF ECONOMIC GEOLOGY in London.

The quantity of Building Stone and Marbles now produced in the immediate vicinity of the Line, amounts to 10,000 tons, carried an average distance of 6 leagues, and about 1500 tons exported into France, the conveyance of which on the Railway would produce 1353*l.* 15*s.* As the Railway passes through vallies which afford most favourable opportunities for quarrying the building stone which is very extensively used, and as the marble quarries are in a great measure prevented from being worked by their being nearly inaccessible, a Railway would materially increase the consumption. Some of the varieties of Marble are very beautiful, as may be seen by inspecting the specimens in the MUSEUM OF ECONOMIC GEOLOGY.

LAND.

The land in the district of the Sambre and the Meuse is in some parts richly cultivated, in others covered with extensive forests, and in many parts is susceptible of great improvements by the facilities which a Railway would afford for conveying coal for burning lime for the application of manure, and for transporting the produce. The present value of arable and meadow land near the Northern part of the proposed Railway, from Marchiennes au Pont to Jamioulx, is about 45*l.* per acre; from Jamioulx to Walcourt, 30*l.* per acre; from Walcourt to Philippville

from 20*l.* to 25*l.* an acre; and in the Southern part of the Line it varies much, according to locality, ranging from 20*l.* to 40*l.* per acre. These prices, derived from numerous local inquiries, and from actual sales, were confirmed by M. Dailly, of Charleroi, a sworn valuer for the Belgian Government and for the Tribunals of the Judicial Arrondissement of Charleroi.

The following letter contains some interesting particulars relative to the value of the railway, as regards Landed Property in the Sambre and Meuse district:

From the COUNT DE BAILLET LATOUR, *Member of the Chamber of Representatives.*

"BRUSSELS, 23d October, 1843.

"SIR,

"I MUCH regret not having replied sooner to the Letter which you did me the honour to write. I was absent when it arrived in Brussels, and it only reached me on my return. I hasten to reply to the different points you refer to; in doing so, allow me to observe that I have very frequently given similar opinions.

"In the first place, it is quite evident, that the lands lying between the Sambre and the Meuse require, from their cold and clayey nature, Lime as a manure; and, moreover, that if the farmers do not make a greater use of it, it is on account of its coming at too high a price. If the Railway was made, the price of Lime would certainly be reduced, and its consumption would increase to double, if not more. The quantity of Coal consumed would consequently increase and be productive to the Railway.

"The high price of Lime arises from the dearness of the Carriage of the Coal. It is conveyed in waggons containing about 4000 kilos (4 tons), and drawn by five and six horses over paved roads and bye roads;* the increase in the cost arising from this cause amounts almost to a prohibition of the use of Lime.

* Often impassable.

" If the farmers could make Lime at a low price, a large quantity of uncultivated Land in the Sambre and Meuse district, now lying fallow, or requiring to be cleared, would be amended and cultivated. I have no hesitation in saying that the number of hectares under cultivation would be increased by one-tenth, or may be one-fifth. Another and a natural consequence would be an increase in the value of Land; that now worth 5 to 600 fcs. the hectare would certainly rise to 7, 8, and 900. Those situated within a league or a league and a half from the Railway would double and even triple in value.

" All kinds of Landed property would increase in value by the making of the Railway. Timber, for instance, which when cut sells now with difficulty and at prices which scarcely pay for the taxes and the guards to look after the forests. Magnificent oaks are either left standing, or sold at ridiculous prices; and this entirely owing to the difficulty of conveying them over often impassable roads. The Railway will give to these forests their real value, whilst their produce will be exclusively conveyed upon it.

" At the present time the inhabitants of the district burn their wood, as they can only dispose of it for a mere trifle. Were the Railway made, they would soon find out the advantage of selling it for the mines, or for the Ports of Ghent, Bruges, Ostend and Antwerp, where they are compelled to import the same kinds, and would use coal in its place. In both cases the Railway would reap the benefit.

" The Railway would moreover convey very considerable quantities of Produce from the Flemish Provinces and the Coast, such as Corn, Flax, Hemp, Flour, Linens, Salt, Colonial Produce and Fish, for the use of the population of the district.

THE COUNT de BAILLET LATOUR,
Member of the Chamber of Representatives.

" A Mons. SOPWITH, Engineer,
Hotel des Pays Bas à Charleroi."

In connexion with the value of land, as forming an important element in the consideration of Railway projects, it is proper to observe, that the regulations of the Belgian government entirely prevent the serious difficulties and expense which are often incurred in England for the purchase of land for Railways. By the Belgian law of expropriation, if a landowner makes what appears to be an exorbitant demand, the projectors of the Railway make a positive offer. If this is not accepted, an application is made to the local tribunal, and immediate possession of the land is obtained, so that no delay arises in the execution of the Works. Arbitrators are forthwith appointed by the local courts to estimate the value; and their determination is afterwards either approved or finally modified by the court. The valuers are required to take into consideration the injury occasioned by the division of the land or severance. If the valuation, as approved by the court, is less than the amount of the positive offer made by the promoters of the Railway, the expenses of applying to the Tribunal fall upon the landowner. The injury sustained by the stoppage of any manufactory from working is also determined, if necessary, by arbitration.

The traffic in Corn is inconsiderable, its present amount would afford little more than £500 per annum, viz.—

Imported into Belgium from France 741 tons, and carried 5 leagues at 0·498, and about 2000 tons brought from the northern end of the Line to Couvin and Chimay, carried 11 leagues, amounting to £512 : 16*s.* : 8*d.* It is considered by persons of great local experience, that this amount would be very materially increased; and that it would be so in the course of a few years, there can be no reasonable doubt. As the above sum, however, is fully established, and as the increase is less obvious than many

of the articles of mineral traffic, the minimum sum of £512 : 16*s.* 8*d.* is retained.

M. Dailly states, that so suitable is Lime as a manure for the country through which the Railway is intended to pass, that, in his opinion, a reduction in the price of Coal would cause six times the present quantity of Lime to be made and used. Kelp ashes are also used as a manure in this district; but at present the price is very high, owing to the cost of conveyance over bad roads in a hilly country. In the southern parts of the Line are large tracts of land, the cost of which, M. Dailly states, would be increased tenfold if a Railway furnished the means of procuring suitable manures at a cheap rate.

WOODS AND FORESTS.

The woods and forests of the district of the Sambre and the Meuse are very numerous, and several of them are of great extent and value. The cost of the timber used in the mines in 1842 was £36,842. The forest of Soignies formerly supplied part of the timber used in the mines of Charleroi, but the supplies are now wholly derived from the district of the Sambre and the Meuse; and timber is brought from Couvin at a cost of 18*s.* 7*d.* per ton; whereas, if any cheap means of conveyance existed, immense quantities of it might be had upon the valleys through which the Railway passes; the contiguity of the forests to the Railway is shown by the map. The vast extent of the forests may be comprehended by a brief notice of a few of them. The forest of Couvin contains 8,650 acres; that of Chimai upwards of 22,000 acres; those of Cerfontaine, Senzielle and Roly, which are crossed by the Railway, contain nearly 25,000 acres. Continuous tracts of land, from 20 to 25 miles in length, present almost unbroken ranges of forests, averaging 4 or 5 miles in width; the

timber of these forests is of great value as an element of Traffic. A cubic metre of oak, which there costs about £1. 4*s*., would be worth from £4 to £4. 16*s*. at Antwerp.

At Couvin M. Sambre, the Superintendent or General Inspector of the extensive forests belonging to the Société Générale, expressed in strong terms his conviction of the great importance of opening out these districts by Railway communication, which he considered would give rise to various branches of trade, such as the supply of bark, coopers' staves, timber for building purposes and for the use of the mines. M. Poulet also afforded similar information, derived from his extensive experience of the forest and mineral districts near the southern part of the Line, where he is the Comptroller of the Société de Couvin.

He states in his letter, that " It is only in the last two years that timber for coal mines has been cut in the forests near Couvin, and the quantity cut this year amounts to 80,000 poles, which have been sent to the collieries at Charleroi, the Borinage, and elsewhere. Taking the average weight of a pole at 10 kilogrammes, this would make a total of 800,000 kilogrammes."

The quantity of Bark sent into Holland from Couvin only may be reckoned to weigh 650,000 kilogrammes, and that from Mariembourg and Nismes, at about two-thirds of that quantity. Wood, which up to this time has been used for burning Lime, would be superseded by Coal, if a Railway was made, and would, in M. Poulet's opinion, produce a very considerable return. He adds—" Another branch of trade, which is yearly increasing in this district, is derived from the sale of oak timber, sawn into planks for the use of joiners, and which is sent from Couvin and the neighbourhood of Chimai to Charleroi, and even as far as Brussels. Some dealers from the latter place have this year made considerable purchases of timber from the

forest of Bois le Comte en Fagne, of Senzielles, &c. All this timber has now to be conveyed by waggons to Charleroi, and thence by water to Brussels." He anticipates, and surely not without reason, that this trade would greatly increase if Railway conveyance was afforded. The staves for casks, wood for wheelwrights, sabots or wooden shoes, &c., which are made in large quantities in the villages of Cerfontaine, Froid Chapelle and Senzielles, would also form important items in the Railway returns.

The following table, derived from authentic documents and local information, exhibits the estimated *Traffic in Timber for Mines, Building, &c.*

Description.	Weight in Tons.	Distance in Leagues conveyed on Line.	Toll per Ton per League.	Amount in Francs.
SAWN TIMBER.				
From Cerfontaine, coming from Chimai, going to Charleroi	1,000	6·60	0·475	2,805
TIMBER FOR MINES.				
From various Forests on the Line to Charleroi, for the use of Collieries.....	30,000	7	0·475	99,750
SAWN TIMBER.				
From Couvin to Charleroi, for the Interior	1,000	11	0·475	5,225
From Chimai, coming on the Line at Couvin, going to Charleroi ..	1,000	11	0·475	5,225
TIMBER FOR MINES.				
From Couvin, for the use of Pits at Charleroi and the Centre Coal Basin.....	5,400	11	0·475	28,215
				141,220 or £5,648

This estimate is confined entirely to two descriptions of Timber, viz. the props for the mines and sawn Timber for

staves, planks, &c.; of the former of these only a very small portion is included as regards the Railway. The Coal Mines of the Centre Basin, or Borinage, consume upwards of 150,000 tons of Timber annually. Of this quantity 5400 tons only are here inserted, although the Forest of Soignies, from whence the principal supplies for their mines were obtained, is for the time exhausted, and the Government, in whose hands it is now placed by the last treaty with Holland in 1842, has greatly restricted the cutting of Timber therein; hence the trade in this article which has recently sprung up in the district of Couvin. The consumption of the Charleroi Coal Field cannot be far short of that of the Centre District. In the above estimate only 30,000 are calculated upon. M. Magis in his Report says—" It is impossible to say, with any degree of exactness, what portion of this enormous consumption of Wood will be conveyed on the Railway; but one thing is certain, viz. that the forests which skirt the Line are, for the most part, at present unproductive, owing to the difficulties of communication which exist, and that consequently the Wood is at an extremely low price."

An important item is omitted altogether, viz. the description of Wood known in England as Timber, such as oaks, beech, ash, &c., but principally the first, for ship building, &c.; such trees may be seen by thousands within a few hundred yards, on both sides of the proposed Line; at present they are not worth cutting down, or, if they are, they must, to use the expression of one of the landed proprietors, be sold at " ridiculous prices." At the southern extremity of the Line, at Couvin and towards Chimai, there are immense tracts of forest lands in the same condition, whilst at Antwerp and Ostend they are compelled to import foreign oak for ship building, &c. Within a few miles of the Vireux Terminus, up the Meuse, is the immense Forest

of the Ardennes, extending for many square leagues, and abounding in the finest Timber. If once the communication between this district and the port of Antwerp was open, there would doubtless be a large and valuable traffic on the Line, not only for the supply of the Belgian ship builders and for other building purposes, but for the ports and dock-yards of Holland.

In the Sambre and Meuse district, near Couvin and Chimai, very fine Oak Timber is used for ordinary purposes, which might often with advantage be replaced by American and Baltic woods at a much lower rate. It is evident that, did the communication exist, the consumers would soon discover this, and make the exchange by sending their oak to the ports and taking foreign wood in its place, thus benefiting themselves and opening a very considerable traffic for the Railway.

The conveyance of Timber will be amongst the earliest sources of revenue to the Line; large quantities will be cut in readiness for its opening.

With reference to these numerous and important considerations, there is no doubt that the traffic in Timber would very far exceed that which now takes place, and would be at least doubled immediately upon the opening of the Railway. This increase may be safely assumed; making, under this head, an annual return of £11,296.

The quantity of Bark prepared in the extensive forests of the Sambre and the Meuse is very considerable, and will be greatly increased by the additional quantity of Timber consumed, and the additional facility of transport. From careful calculations, it appears that the carriage of the quantity now sold from these points, if conveyed on the Railway, would amount nearly to £600 a year, this, on the opening of the Railway, will very probably be doubled, and the amount for this article may at least be estimated at £1000.

These general views of the nature of the country and of its chief products, its stores of Coal and Iron, its quarries of durable Building stone, of beautiful Marbles and of Slate, its vast forests and extensive Agricultural districts, sufficiently indicate an abundance of the elements of extensive traffic.

PASSENGERS.

The Sambre and Meuse Railway not only furnishes useful communication between the towns and villages of a populous and highly-industrious part of the country, but forms also a connecting link between the principal ports and cities of Belgium and the important manufacturing towns of the Ardennes, communicating with Lines of Railways, now either in progress or projected, to Paris on the one hand, and to the Upper Rhine and Switzerland on the other; and hence the probability of its becoming a considerable Passenger Line, in addition to its present capabilities. Nor is it undeserving of notice, that the whole of the scenery traversed by this Railway is in the highest degree romantic and picturesque, which, with the cheapness of travelling, the excellence of the accommodations afforded at the Inns, and the architectural and historical interest of many places on the Line, would probably attract Tourists to a district so interesting and so easily accessible.

Commencing from the fortified town of Charleroi, and following the Railway to Vireux, the Tourist would find almost every spot replete with historical associations, with magnificent scenery, and with geological and mining interest. The Banks of the Meuse from Vireux to Namur, and those of the Sambre from Namur to Charleroi, complete a circuit which, for solid attractions, it would be difficult to equal. It is, however, foreign to the object of

this statement to comment at length on these attractions, or to found any calculations upon them.

The Passenger traffic created in a country newly opened out by a Railway is known to be very considerable, as compared with the number of those who avail themselves of ordinary modes of conveyance on common roads. The number of travellers now passing along the roads from Charleroi to Beaumont and Chimai, and from Charleroi towards Philippville and Couvin, amount to 254 carried one league daily by public conveyances, and at least as many more travel by other modes in the central parts of the district where there are no public conveyances, making 508 travelling one league daily. When it is considered that this is only equivalent to about twenty persons travelling the whole length of the Line each way per diem, it may be reasonably anticipated that this number would be doubled or trebled; or say that the increase would be $2\frac{1}{2}$ times, we shall then have 463,700 leagues travelled in one year, which at the respective rates, 0·50, 0·35, and 0·25* for first, second and third class passengers, and in the proportions as to number corresponding with those of the Belgian Railways now in operation, viz. $\frac{8}{81}$, $\frac{26}{81}$, and $\frac{47}{81}$, would produce the following amounts, viz.:

Diligence, or First Class	4,163	carried	11	leagues	. . 22,896·50
Chars à Banc, or Second Class	13,531	—	11	—	. . 52,094·35
Waggons, or Third Class . . .	24,461	—	11	—	. . 67,267·75
					142,258·60
				Or	£5690 6 10
To which, for travelling which would be diverted into this Line, may be added					1500 0 0
					£7190 6 10

* The Belgian League, being little more than 3 English miles (3 miles and 189 yards), the charge for 1st, 2d and 3d class passengers is respectively $1\frac{1}{10}$, $1\frac{17}{100}$ and $\frac{8}{10}$ of a penny per English mile.

The increase of Passenger Traffic on the Belgian Railroads generally has exceeded *five times* the amount of travelling by the roads previously existing.

The passengers' luggage for the above number of passengers, in the same ratio as that which now prevails on the Government Lines, amounts to £205.

GENERAL TRAFFIC.

The advantages to be derived from the construction of this Railway must appear obvious on a review of the particulars already stated. The Line is well calculated to effect, in an economical and satisfactory manner, the several objects for which it was expressly designed. A view of the existing requirements of the district and of the statistics derived from actual experience presents important features, which furnish a solid basis independently of any other anticipations—extensive mines of Coal and Iron, which, being separated, require cheap means of intercommunication, large tracts of land, which admit of vast improvements, the total absence of Railways or Canals, and the scarcity of good roads in a country studded over with extensive manufactories, mines and quarries. Under these conditions, a Railway supplying only the existing demands of the country would possess at once a remunerating trade, whilst every part of the Line offers a reasonable prospect of a great increase on the present traffic, if the resources of the country were developed by the completion of the proposed Railway. It forms a direct means of valuable intercommunication between the Coal Field of Charleroi and the rich Iron Mine Districts; it forms a link in what will doubtless become an important and much frequented line of European travelling, in a direct line from England, Belgium and Holland to the North-Eastern parts of France, the Upper Rhine and Switzerland; it will afford

constant and cheap means of travelling to the industrious inhabitants of a populous country, and increase trade and manufactures, which, even under all the existing discouragements, are sufficiently extensive to yield a remunerating revenue for the cost of a Railway; and it will open out those rich treasures of Marble, Slates and other productions of the country, which are now comparatively buried in the midst of mineral and forest districts, without any means of economical transport.

The Traffic Tables, prepared by the Government Engineers, are actually based, not on the existing traffic of the country, but on such parts only of that traffic as they could establish by Official Documents, without including much information which they admit, nevertheless, to be authentic. The only exception to this principle is in their estimate of the number of Passengers. It is sufficiently well known that, under ordinary circumstances, a Railway increases the existing traffic, but this is more especially the case in a rich mineral district, destitute of any adequate means of transport, and free from all possibility of Canal competition. It would appear reasonable, therefore, that the Government Engineers should have contemplated some increase of the present traffic, but it must be borne in mind that the only duty they had to perform was to assure the government that the returns would more than cover the amount of the guarantee which was at that time contemplated. Hence it is quite clear that if a minimum of traffic sufficed to do this on what they state to be a maximum estimate of cost, it was all that was required on their part. The strict limits to which the Government Engineers have confined themselves in their estimate of the returns, will at once appear from the following passages in the Official Report of the Chief Engineer, M. Inspector

De Moor, to the Minister of Public Works, dated January 25th, 1844.

" The quantities of Raw Materials consumed, and of manufactured iron produced, by such establishments as will make use of the Sambre and Meuse Railway, are calculated upon an average of seven years, viz. from 1836 to 1842. This mode of average I consider a correct one. It *avoids* those periods of over production, which must not be calculated upon as likely to recur. It shows about the average consumption of 1841 and 1842; and, as such, is very moderate. This Branch will certainly, in my opinion, exceed the estimate made of it by the authors of the project. The same observation will apply to the exportation of coals. M. Magis has fixed the annual average at 65,000 tons only: whereas, on the 1st of December, 1843, more than 75,000 tons had been entered at the Custom House of Heer (below Givet on the Meuse) only for the first eleven months of the year. The construction of the proposed Railway must certainly tend to increase the quantity."

" The estimated consumption of coal has been confined to that portion of the population residing within one league on either side of the proposed Line of Railway; but by establishing depots, it will be conveyed greater distances. Moreover, the population of that part of Belgium will increase rapidly by the opening of the proposed Line of Communication."

" The quantity of Timber to be cut in the immense forests of the district between the Sambre and the Meuse, and which will be conveyed on the Railway as far as Marchienne au Pont for the use of the collieries in the coal basins of the centre and Charleroi, for ship and other building purposes in the different provinces, is estimated

at 40,000 tons; but the perusal of M. Magis's Report on this Branch of the Railway Revenue must convince any one that the estimate of timber traffic will, from the opening of the Railway, be considerably exceeded."

"The traffic of Heavy Goods will form the greater part of the returns. I consider the quantity assumed by M. Magis to be a minimum, which will be very considerably exceeded."

"I come now," continues the Report of the Chief Engineer, "to the Conveyance of Passengers and their Luggage, Carriages, Horses and Cattle, Light Goods, Specie, &c." the moderation of which estimates he illustrates by a detailed comparison with a similar Line of Railway; and he again expressly states that the expenses have been calculated at a maximum, "and the receipts at a minimum, which will be exceeded from the commencement."

These extracts show that the careful and elaborate Calculations of existing Traffic made by the Government Engineers admit of being considerably increased by the reasonable prospect of the usual effects produced by cheapness of transport. In the estimates of the probable rteurns, such additions only have been made, as were justified by the testimony of the best informed persons of the district, confirmed by the observation and experience of similar cases, and kept in every instance within the limits of the most prudent and reasonable anticipation of that increase of existing Traffic which forms the very basis of all Railway enterprise.

It is evident that in a country rich in minerals, without either Canals or good Roads, the construction of a Railway cannot fail to produce a demand for mineral products which cannot exist in the absence of good means of

transport. While, therefore, it would be absolutely contrary to common prudence to suppose that no addition will be made to the existing traffic by a Railway which for the first time opens out this rich mineral territory, it appears equally necessary to avoid whatever may run the slightest risk of being considered visionary. The first object has been to ascertain that the district really contained the elements of extensive mineral traffic; the next, to ascertain the proportion which must of necessity come upon the Railway; and this, founded on authentic data for an average of the last seven years, affords a solid basis for the estimate of existing traffic. Those who have observed the effect of Railway Communication in creating traffic, even where good Roads and Canals were to be competed with, will readily understand how much greater are the chances of an increase where no such advantages exist. The estimated increase which is added to the existing traffic is rather a requisite acknowledgment of a principle under these circumstances, than an expression of opinion as to the definite amount of increase, which will, it is believed, exceed in every instance the additions made.

In conformity with this principle, the following statement is a minimum estimate of existing Traffic in various branches, upon which an increase of 25 per cent. may be relied upon as soon as the Railway is opened:—

			£	s.	d.
Marbles, Building Stone and Lime Stone			1533	15	0
Charcoal for consumption in Iron Works:					
5668 tons, carried 2 leagues at 0·425 ..	4944·45				
2450 do. .. 3 do. at 0 425 ..	3123·75				
4944 do. .. 4 do. at 0·425 ..	8414·80				
	16483·00	—	659	6	4

	Number.	Leagues.			£	s.	d.
Horses,							
Exported from district ..	350	6	0·90	1900·80			
Going to and from Fairs in District	300	6	0·90	1620			
Going into France from Germany, conveyed from Marchienne to Couvin	800	11	0·90	7920			
Cattle, viz. Cows, Oxen, &c.							
Going into France from Charleroi and Neighbourhood .	50	11	0·90	385			
Going to and from Fairs in District	200	6	0·70	840			
Calves, Pigs, Sheep, &c.							
Going into France from Charleroi and the Environs ..	1240	11	0·40	5456			
Going to and from Fairs in District	500	6	0·40	1200			
				19321·80	— 772	17	5
Beer, Spirits, Vinegars, and other Liquors.							
For Consumption of District, brought from Marchienne Terminus to various parts of Line	2000	6	0·498	5985			
Wine in Cask,							
Imported from France or brought from Interior, for Consumption of District .	826	6	0·498	2471·80			
Wines in Bottle.							
Ditto. ditto.	150	6	0·498	448·87			
				8905·67	— 356	4	6
Kelp Ashes,	Tons.	Leagues.	Francs.				
Conveyed from Marchienne to various parts of the District	1400	6	0·525 ..		176	8	0
Tiles,							
From the Marchienne Terminus to various parts of the District	1500	5·	0·525 ..		157	10	0
From the Potteries of Walcourt and Boulers	500	4	0·475 ..		38	0	0
					3694	1	3
			Increase of 25 per cent. ..		923	10	4
					4617	11	7

The colonial produce now consumed by the inhabitants

residing within one league of the Railway will afford a traffic amounting to 1288 tons carried six leagues, and 300 tons carried eleven leagues, and producing, at 0·525 per league, £228 : 3*s*. This calculation, founded on Statistical Returns, embraces only the actually ascertained consumption of the inhabitants residing within a league of each side of the line; but there can be no doubt that the Railway would be the means of conveying colonial produce for the interior of the Sambre and Meuse district generally, and also for the consumption of the Ardennes. The income from this source of traffic may be safely estimated at £1000.

In estimating the quantity of light goods, parcels, &c. which would probably be sent by this Railway, the quantities of this kind of traffic ascertained to have travelled on the Government Railways in 1842, have been taken as a fair basis of calculation. In some parts of the Government Lines, and especially those which approach the capital, there is no doubt that the number of parcels of light goods far exceed what would probably be carried on the Sambre and Meuse Railway; but on the other hand, a near equality would exist between it and the more remote inland portions of the Government Lines. Moreover, the Government Lines are more liable to the competition of diligences, which now carry a considerable quantity of goods of this description. In the absence of other data, one half of the average traffic in light goods, &c. may be safely assumed, which gives the following result:—

Packages	Frs. 22,166·00		
Goods charged by weight	30,390·73		
Specie	3,449.06	£	*s*. *d*.
	2,240	0	7

The Direction of the Traffic which now exists is accurately ascertained to be as follows:

In the direction of Charleroi to Vireux, or down the Line.		
Tons carried one League on Main Line by Locomotive Power	1444,101·59	
Tons carried one League on Branches by Horse Power	85,798·53	
		1,529,900·12
In the direction of Vireux to Charleroi, or up the Line.		
Tons carried one League on Main Line by Locomotive Power	931,042·99	
Tons carried on Branches one League by Horse Power	262,293·53	
		1,193,336·52
Total Tonnage one League ..		2,723,236·64

It is important to observe, that the down, and up or return Traffic, balance within less than one fifth. Hence the economy in working the Line cannot fail to be considerably greater than in Lines where a preponderance of traffic is in one direction.

SUMMARY OF TRAFFIC.

So numerous are the materials for traffic, and so probable, nay so inevitable, is the increase of existing trade which must ensue, that it would be easy to form a much higher estimate of returns than has been adopted, without exceeding the rational grounds of anticipation which are so abundantly furnished by the present statistics of the country. With reference to those views of prospective traffic which affect the interests of the shareholders, such anticipated increase has been kept strictly within the limits which are justified by the result of very extended examinations, and by documents of unquestionable authority.

The following is a Summary of the estimated Traffic on the Railway.

Coal exported to the Ardennes and North-Eastern departments of France .	£32,984	0	0			
Ditto for the consumption of Iron works and manufactures of the District of the Sambre and Meuse	3,412	11	2			
Ditto for domestic use in the Districts through which the Railway passes .	5,363	0	0			
Ditto for burning lime in the Agricultural Districts on the Line . . .	2,152	0	0			
				43,911	11	2
Iron Ores conveyed from the Mines to the several Iron works of the District .	17,361	0	0			
Pig and Wrought Iron manufactured in the District and conveyed on the Railway	2,988	17	7			
				20,349	17	7
Timber for Mines, building, &c. . . .				11,996	0	0
Bark				1,000	0	0
Corn				512	16	8
Slates				2,138	0	0
Marbles, Building Stone and Limestone .	1,533	15	0			
Charcoal for consumption in Iron works .	659	6	4			
Horses, Cattle, &c. &c. . . .	772	17	5			
Beer, Spirits, Wines, &c. . . .	356	4	6			
Kelp Ashes	176	8	0			
Tiles	195	0	0			
Estimated Increase of 25 per cent. on the six preceding articles of Traffic . .	923	10	4			
				4,617	1	7
Colonial produce for the consumption of the District, and for importation into France				1,000	0	0
Passengers				7,190	16	10
Passengers' Luggage				205	0	0
Light Goods, Parcels and Specie				2,240	4	7
				94,461	8	5

The gross annual receipts thus estimated amount to 94,461*l.* 8*s.* 5*d.*, and it has been ascertained by careful calculations, that the expenses of working will not exceed 40 per cent.; the net receipts would therefore amount to 56,676*l.* 17*s.* 1*d.*, or $9\frac{1}{8}$ per cent. on the capital.

COST OF THE RAILWAY.

The total Cost of the Railway has been ascertained from detailed plans and sections, and confirmed by experienced contractors, who are prepared to execute the works at the estimated amount of 472,200*l.* This includes the construction of the Railway complete in all respects for working, including land, permanent way, stations, workshops, &c. The requisite plant is calculated to cost 60,000*l.* more, making a total of 532,200*l.* The additional sum of 87,800*l.* is considered, making 620,000*l.* the capital of the Company, sufficient to cover the interest at three per cent. upon the paid up capital during the period of construction, expenses of management, and all other contingencies.

THE COST OF WORKING the Line has been calculated from the experience obtained on the great Lines of Railway in Belgium, with such modifications as are due to the abundance of Mineral Traffic, and to the nearly equal balance of it in both directions. The total exemption from all payments analogous to the Land Tax, Poor's Rate, Duty on Passengers, &c., in short an entire exemption from all taxes and imposts whatever is a material element of economy in this Department; these calculations amount to about 40 per cent. of the gross receipts, as shown by the preceding statements, which give the following result:

Gross Receipts . . .	£94,461	8	5
Cost of Working . .	37,784	11	4
Leaving	£56,676	17	1

or full 9⅛ per cent. upon the proposed Capital of 620,000*l.*

APPENDIX, No. I.

AN ACCOUNT of the several COAL MINES in the judicial Arrondissement of CHARLEROI, showing the extent of Surface, the depth of the Pits, the number of Seams or Beds of Coal capable of being worked, the number and thickness of the Beds then being actually worked, the number of Workmen employed, the quantity of Coal extracted, and the several qualities of the Coal, and the uses to which they are applied.—Extracted from the Returns made for the year 1838, *and published in the Report of the King.*

Number.	Names of Mines.	Extent of Surface.	Depth of Pits.	Number of Seams of Coal capable of being worked.	Thickness of the Seams or Beds of Coal now being worked.	Number of Workmen.	Quantity of Coal extracted.
		Hectares.	Metres.		Metres.		Tons.
70	La Hestre	433	212	11	0·75	280	44,983
			93		0·80		
			274		0·60		
			224		0·30		
			203		0.40		
			110				
71	Mariemont	500	127	8	0·60	90	17,102
			167		0·80		
			162		0·80		
			70				
72	L'Olive	250	196	8	0·80	214	36,617
			217		0·80		
			170		0·50		
73	Chaud-Buisson	400					
74	Bascoup	2700	166	7	0·80	150	35,016
			170		0·80		
			250		0·50		
			238				
			177				
75	Carnières	760	..	7			
76	Courcelles-Nord ...	133	123	7	0·70	114	11,284
					0·80		
					0·60		

Quality and Use of the Coal—Referring to the Numbers in first Column, which Numbers also refer to the large Mineral Map of Belgium, published by Mr. Vander Mælen.

No. 70—74. Highly bituminous Coal, apt to "fall," used for Steam Engines, Breweries, Distilleries, Puddling Furnaces, Glass-making, and for Domestic purposes.

No. 76. Poor Coal for Brick and Lime Burning, and for Household purposes.

Number.	Names of Mines.	Extent of Surface.	Depth of Pits.	Number of Seams of Coal capable of being worked.	Thickness of the Seams or Beds of Coal now being worked.	Number of Workmen.	Quantity of Coal extracted.
		Hectares.	Metres.		Metres.		Tons.
77	Benne-Sans-Fosse..	65	20	4	0·80	18	506
			34		0·80		
78	Falnuée	400	21	5	1·10	74	10,255
			37		0·90		
					1·10		
79	Trieu-de-la-Motte ..	250	50	3	0·90	44	4,776
			54		1·00		
					0·40		
80	Sars-Lez-Moulin ...	650	70	15	0·50	60	7,014
80*			70		1·00		
81	Martinet	333	122	15	1·20	123	21,742
			140		1·20		
			35		1·00		
			26		0·60		
			26				
82	Wartonlieu.....	89	25	5	0·60	20	3,352
83	Grand-Conty	1172	58	7	1·20	56	4,879
					0·60		
					0·80		
84	Grand-Bordia.....	456	63	7	0·90	74	6,273
					0·35		
					1·00		
85	Caylette-Hermite-et-Grosse-fosse.	375	38	4	0·80	107	13,071
					0·80		
					1·00		
86	Bois-d'Heigne	195	29	11	0·80	130	10,756
			32		0·92		
			2Adits.		0·60		
					0·56		
					1·20		
87	Amercoeur { Amercoeur.						
88	Amercoeur { Nav-à-Bois ..	295	163	33	0·80	31	6,497
89	Amercoeur { Rouges-eaux ..	..	32				
90	Bois-d'Elville.....	..	134	18	..	55	5,081
91	Bois-des-Hamendes .	131	35	7	0·60	56	1,050
			35		0·70		
			25				
			24				
92	Réunion du Nord { Trau	45					
93	Réunion du Nord { St. Antoine	209	45	3	..	14	508

Quality and Use of the Coal.

Nos. 77, 78 & 79. Poor Coal for Brick and Lime Burning, and for Household purposes.

No. 80. Slightly bituminous Coal, used for Puddling Furnaces.

No. 80*. Poor Coal, for burning Lime and Bricks.

No. 81. Slightly bituminous Coal, used for Steam Engines, Breweries, Distilleries, Puddling Furnaces, Glass making, and Domestic purposes.

Nos. 82—93. Poor Coal, fit for Brick and Lime-burning, and Household purposes.

Number.	Names of Mines.	Extent of Surface.	Depth of Pits.	Number of Seams of Coal capable of being worked.	Thickness of the Seams or Beds of Coal now being worked.	Number of Workmen.	Quantity of Coal extracted.
		Hectares.	Metres.		Metres.		Tons.
94	Saint-Bénoit	281	7	1	..	8	116
95	Bois-Domanial	438		1			
96	Grosse-et-petite	116	21	5	0·40	14	2,182
97	Masse, Mal-et-fichefet	108	23		1·00		
	Réunies	..	26				
98	Apaumée	277	5	4	0·50	23	2,000
			6		0·70		
			9				
			17				
99	Bois-du-Roi..... .	136	172	4	0·60	100	4,687
			20		0·80		
			28				
100	Bois-Communal....	92	28	5	0·65	13	
101	Bois-de-Soleilmont..	100	18	7	0·40	10	280
102	Dix-huit-Boniers de Soleilmont.	56	28	4	0·90		
			30		0·90	11	1,421
103	Petit-try, St.-Marie, Trois-sillons.	278	91	10	1·00	116	13,815
			37		0·70		
					0·80		
104	Petit-houilleur	84	72	..	0·80	49	4,861
			17		0·40		
			16				
105	Bonne-Espérance ..	956	15	2	0·90	65	28
					1·00		
106	Baulet	650	79	8	1·00	60	7,660
			35		0·80		
					1·00		
107	Lodelinsart { Quatorze-Actions	429	280	19	0·60	316	19,230
108	Gurgeat	..	170		1·00		
109	Long bois	..	340		1·20		
			70		0 60		
					0·80		
110	Combles-de-Noël ..	68	6	10	1·00	14	1,950
			4		0·30		
			7		0·40		
111	Noël	75	21	13	1·00	11	285
					0·40		
112	Noël, Sart-Cuparlt, Veine-Auclou, Pistole.	748	10	9	0·70	9	
113	Les Ardinoises	263	165	10	1·00	319	26,343
			248		1·00		
			113		0·70		

Quality and Use of the Coal.

Nos. 94—106. Poor Coal, fit for Brick and Lime-burning, and Household purposes.
Nos. 107, 108 & 109. Slightly bituminous and poor Coal, for use of Glass Houses, burning Bricks and Lime, and for Domestic purposes.
Nos. 110—113. Poor Coal, for burning Bricks and Lime, and for Household purposes.

Number.	Names of Mines.	Extent of Surface.	Depth of Pits.	Number of Seams of Coal capable of being worked.	Thickness of the Seams or Beds of Coal now being worked.	Number of Workmen.	Quantity of Coal extracted.
		Hectares.	Metres.		Metres.		Tons.
114	Serre-et-Margrawe..	20	70	2	0·80	2	10,200,219
			35		1·00		
115	Réunion à Gilly: Mère-des-Veines et Strapette.	112	166	4	0·90	163	
					0·65		
116	Réunion à Gilly: Grande-et-Petite Aise.	112	141		0·50		
					1·00		
117	Réunion à Gilly: Ronche	112	113		1·20		
118	Cayaut qui-bout-et-Pisselotte.	92	33		1·00	10	36
					0·80		
119	Vivier-Coquelet-du-couchant.	53	49	3	1·00	6	169
120	Vivier-Coquelet-du-levant.	606	354	4	1·00	155	10,740
			310		0·60		
			30				
121	Roton	74	87		0·50	106	8,183
					0·60		
					1·50		
					1·00		
122	St. Catherine	744	308	13	0·70	136	14,373
123	Masse St. François..	744	24	..	0·80		
124	Droit jet	744	21	..	0·80		
125	Monceau-fontaine ..	1898	89	5	1·00	225	20,087
			144		0·60		
			17		0·50		
			25		0·60		
			35		0·80		
					0·80		
					0·40		
126	Chauw-à Roc	33	154	20	1·20	112	6,931
			38		1·40		
			70		1·40		
127	Bayemont	160	192	11	0·80	313	14,237
			37		0·80		
					0·80		
					0·90		
128	St. Martin	264	28	3	0·57	57	
					0·80		

Quality and Use of the Coal.

Nos. 114—120. Slightly bituminous Coal, used for Glass-making and Household purposes.

No. 121. Slightly bituminous Coal, used for burning Bricks and Household purposes.

Nos. 122, 123 & 124. Slightly bituminous and poor Coal, fit for Brick and Lime-burning, and for Household purposes.

No. 125. Bituminous Coal for Coke, and slightly bituminous for Iron smelting and Household purposes.

No. 126. Slightly bituminous for Glass Works and Household purposes.

No. 127. Rich bituminous Coal, for Coke; slightly bituminous, for Puddling Furnaces and Household purposes.

No. 128. Slightly bituminous, for Household uses.

Number.	Names of Mines.	Extent of Surface.	Depth of Pits.	Number of Seams of Coal capable of being worked.	Thickness of the Seams or Beds of Coal now being worked.	Number of Workmen.	Quantity of Coal extracted.
		Hectares.	Metres.		Metres.		Tons.
129	Réunion-à-Mont-sur-Marchienne.	1121	56	9	1·00	150	18,387
			114		0·60		
129*			45		1·20		
			28		1·20		
130	Marcinelle-Nord ...	738	185	6	0·92	244	41,490
			290		0·80		
130*			177		0·60		
130†			114		1·80		
			87		1·20		
131	Sacré Madame	216	350	8	1·30	429	30,793
			147		0·60		
			119		1·30		
131*			126		0·70		
			72		0·60		
			58				
			28				
			28				
			28				
			28				
132	Sacré-Français	143	203	4	0·90	264	11,057
			70		0·50		
			30		0·80		
			47				
133	Mambourg-e-bawette	357	29	3	1·50	601	33,618
			105		0·95		
133*			142		1·40		
			137		0·87		
			116				
			122				
			114				
			112				
			125				
			78				
			73				
			61				
			87				
			76				
			82				
			77				
			78				
			59				

Quality and Use of the Coal.

No. 129. Slightly bituminous, for Puddling Furnaces.
No. 129*. Household Coal.
No. 130. Rich Coal, suitable for smelting Iron.
No. 130*. Slightly bituminous, for Puddling Furnaces.
No. 130†. Poor Coal, but suitable for Household purposes.
No. 131. Rich Coal, suitable for Iron Works and Gas-making.
No. 131*. Slightly bituminous Coal, for Puddling Furnaces, Gas-making and Household purposes.
No. 132. Rich Coal, used for Blast Furnaces and Glass Works.
No. 133. Rich Coal, for the Smelting Furnaces.
No. 133*. Slightly bituminous Coal, for Glass-houses and Household purposes.

Number.	Names of Mines.	Extent of Surface.	Depth of Pits.	Number of Seams of Coal capable of being worked.	Thickness of the Seams or Beds of Coal now being worked.	Number of Workmen.	Quantity of Coal extracted.
		Hectares.	Metres.		Metres.		Tons.
134	Belle-Vue	357	..	1			
135	Sablonnière	153	453	12	1·65	270	20,137
			332		1·10		
			155		1·00		
			191		1·10		
			350		1·00		
136	Bonne-Espérance ..	309	346	2	0·40	172	13,551
			249		0·50		
			47				
137	Masse-et-Droit-jet ..	..	52	7	1·00	16	650
138	Houppe-en-lair	520	73	3	0·35		
139	Grand-Mambourg-pays-de-liège.	520	218	8	0·80	117	10,116
			218		0·70		
			46		1·40		
140	Poirier	520	297	4	0·60	129	3,043
			53		0·60		
141	Trieu-kaisin-et-grand-forêt.	558	346	4	1·00	369	36,137
			92		0·60		
			107		0·50		
			63				
			177				
			40				
			42				
			30				
			42				
142	Petit-forêt	200	210	..	1·00	338	33,604
			79		0·50		
			106		0·60		
			39				
			30				
143	Les Combles	200	35	..	1·00	22	
144	Gouffre	760	91	9	0·80	675	32,516
			91		0·70		
			175		1·00		
			98		0·40		
			40		0·80		
			47				
			35				
			35				
			35				
145	Leernes-et-Landelies	285	..	2			

Quality and Use of the Coal.

Nos. 134—138. Slightly bituminous Coal, suitable for Puddling Furnaces and Household use.

Nos. 139—143. Rich bituminous Coal, for Iron smelting and Domestic uses.

Nos. 144 & 145. Slightly bituminous and poor Coal, for Domestic use, for burning Bricks, Lime, &c.

Number.	Names of Mines.	Extent of Surface.	Depth of Pits.	Number of Seams of Coal capable of being worked.	Thickness of the Seams or Beds of Coal now being worked.	Number of workmen.	Quantity of Coal extracted.
		Hectares.	Metres.		Metres.		Tons.
146	Forte-Taile	569	68 50	19	1·00	79	7,106
147	Marcinelle-Sud	133	..	1	..	10	10
148	Bois-du-prince	319	..	2	..	5	28
149	Bois-de-Casier	254	108	7	1·00	48	3,176
150	Fistaux-de-Couillet..	195	57	3	1·10	38	2,231
151	Carabinier-Français	200	177	4	0·88 1·00	90	12,889
152	Pont-de-loup Nord..	538	52	3	0·90 1·00	18	747
153	Pont-de-loup-Sud ..	302	70 19	4	1·10 0·55	58	13,998
154	Aiseau	475	17	6	1·10	48	804
	Toteaux..	30,686				8345	724,359*

Quality and Use of the Coal.

Nos. 146—150. House Coal.
No. 151. Slightly bituminous Coal, for Puddling Furnaces and Household uses.
No. 152. House Coal.
No. 153. Slightly bituminous Household Coal.
No. 154. House Coal.

* The quantity raised in 1842 was 1,130,000 Tons.

APPENDIX No. II.

IRON MINES in the Judicial Arrondissement of CHARLEROI, and in the Province of Namur.

No.	Situation of the Mines.	Extent of Surface conceded.	Thickness of the Beds from which Iron Ore is obtained.	Depth of Mine.	Number of Workmen.	Quantity extracted Annually.
		Hectares.	Metres.	Metres.		Tons.
1	La Buissière	203	15·00	40	12	840
2	Gerpinnes	2,356	2·00	16	10	1,000
			6·00			
2*			2·00			
			7·00			
2†			7·00			
2‡			8·00			
3	Saint-Amand	..	9·00			
4	Presles					
5	Bouffioulx	..	2·00			
5*			8·00			
6	Montignies-le-Tilleul	..	5·00			
7	Gougnies	..	5·00	15	4	92
8	Villers-Poterie	..	2·00—5·00			
9	Acoz	..	6·00			
10	Joncret	..	7·00	15	8	1,400
11	Gerpinnes	..	5·00	10	3	102
12	Cour-sur-Heure	..	3·00			
13	Thuillies	..	20·00	6	3	276
14	Solre-sur-Sambre					
15	Erquilinnes					
16	Leugnies	..	..	8	6	116
17	Solre-St.-Géry					
18	Champion, Marchovelette	488	2	30	20	1,082
19	Champion, Védrin....	234	6	18	8	1,972

Quality and Use of the Products.

No. 1. Yellow Ore of middling quality, used to make Iron for Castings.
No. 2. Yellow Ore of very middling quality.
No. 2*. Yellow Ore of good quality.
No. 2†. Good Yellow Ore.
No. 2‡. Very good Yellow Ore, and some excellent ditto.
No. 3. Good Yellow Ore.
No. 4. Yellow Ore producing tough iron.
No. 5. Bad Yellow Ore.
No. 5*. Yellow Ore, yielding less than 25 per °/₀.
Nos. 6—16. Middling Yellow Ore.
No. 17. Excellent Yellow Ore.
No. 18. Strong Ore.
No. 19. Mixed Ore.
No. 20. Strong and Mixed Ore.

No.	Situation of the Mines.	Extent of Surface conceded.	Thickness of the Beds from which Iron Ore is obtained.	Depth of Mine.	Number of Workmen.	Quantity extracted Annually.
		Hectares.	Metres.	Metres.		Tons.
20	Boninne, Marche-les Dames	545	2 à 10	25	24	3,300
21	Marchovelette, Gelbressée	179	5 à 6	40	22	592
22	Francwaret, Gelbressée	548	..	17	2	786
23	Vézin.....	..				
24	Biesme	911				
25	Tarcienne, Somzée ..	1,051				
26	Oret, Mettet	763				
27	Biesmerée, Stave	850	1 à 5	12	9	420
28	Berzée, Thy-le-Chateau	687	1 à 4	10 à 13	15	672
29	Gourdinne.....					
30	Florenne	450	..	10	45	1,888
31	Weillen, Serville	448	1·40	17	10	2,604
32	Flavion, Anthée					
33	Yve, Gomzée	512				
34	Daussois, Vogenée ..	131	0·80	12 à 20	18	2,140
35	Silenrieux					
36	Daussois	195	0·80	12 à 20	24	1,320
37	Olloy.....	69	..	12	3	222
38	Balatre	..	..	7	4	174
39	Beez	..	0·30 à 9·00	25	8	690
40	Biesme	..	2	13	28	8,000
41	Bouge	..	..	18	2	92
42	Ciney.....	..	6	21	4	240
43	Couvin	..	..	7 à 16	12	2,677
44	Daussoux	..	2·80	15	12	2,100
45	Denée	..	..	8	2	1,000
46	Dourbe	..	..	12	6	388
47	Emine	..	4·50	20	8	1,700
48	Fagnolle	..	0·20 à 0·60	4 à 8	12	425
49	Falisolle	..	3	24	6	300
50	Fenalle	..	..	6	8	1,500
51	Floreffe	..	..	13	30	627
52	Florenne	..	..	6 à 14	54	5,760
53	Fosses	..	2 à 3	15	40	1,200
54	Fraire	..	0·40 à 1·80	9 à 20	96	4,916

Quality and Use of the Products.

Nos. 21—27. Strong Ore.
Nos. 28, 29. Mixed Ore.
No. 30. Strong Ore.
Nos. 31—33. Mixed Ore.
Nos. 34, 36, 37. Strong Ore.
No. 38. Tender Ore.
No. 39. Mixed and Tender Ore.
No. 40. Strong Ore.
Nos. 41—43. Mixed and Tender Ore.
No. 44. Strong Ore.
No. 45. Mixed Ore.
No. 46. Strong Ore.
Nos. 47—50. Mixed Ore.
Nos. 51, 52. Strong Ore.
No. 53. Mixed Ore.
No. 54. Strong Ore.

No.	Situation of the Mines.	Extent of Surface conceded.	Thickness of the Beds from which Iron Ore is obtained.	Depth of Mine.	Number of Workmen.	Quantity extracted Annually.
		Hectares.	Metres.	Metres.		Tons.
55	Hamois	..	..	9	10	2,400
56	Hansinne	..	1 à 3	8 à 15	21	18,530
57	Han-sur-Lesse	..	1·60 à 1·00	18	24	774
58	Jamiolle	..	..	4 à 18	8	1,400
59	Jemelle	..	0·90	12	2	24
60	Ligny	..	7 à 12	20 à 40	75	45,000
61	Lisogne	..	5·50	20	10	1,000
62	Morialmé	..	..	10 à 20	219	31,390
63	Nameche	..	..	20	4	600
64	Namur	..	1 à 3	20	10	2,800
65	Nisme	.	..	4 à 35	95	1,970
66	Olloy.....	..	.	12	3	222
67	Onhaye	..	0·20 à 0·30	7 à 24	12	380
68	Oret	..	0·95	11	3	190
69	Pétigny	..	..	6 à 12	10	1,930
70	Rhisne	..	..	20	53	10,074
71	Rochefort	..	0 30 à 0·60	18	24	225
72	St. Aubin*	..	..	30	5	
73	St. Marc	..	1·30 à 15·00	20 à 70	36	6,440
74	St. Martin, Balatre ..	..	..	18	6	1,050
75	Tongrinne, Tongrenelle	..	..	24	33	19,800
76	Védrin	..	1·30 à 9·00	40	40	7,970
77	Vitrisal	..	..	6	25	1,000
78	Yve	..	..	10 à 26	54	5,090
	Total..	25,376			1,435	212,085

Quality and Use of the Products.

Nos. 55, 56. Mixed Ore.
Nos. 57—59. Strong Ore.
No. 60. Strong and Mixed Ore.
No. 61. Tender Ore.
No. 62. Strong Ore.
No. 63. Tender Ore.
No. 64. Strong and Mixed Ore.
Nos. 65, 66. Strong Ore.
Nos. 67, 68. Mixed Ore.
No. 69. Strong Ore.
No. 70. Strong and Tender Ore.
Nos. 71, 72. Mixed Ore.
No. 73. Strong and Mixed Ore.
Nos. 74, 75. Mixed Ore.
No. 76. Strong and Mixed Ore.
No. 77. Tender Ore.
No. 78. Strong Ore.

* It is in this commune that the Bois des Minières is situated; but at the time this Report was made, the workings were suspended. In 1839, a new grant was obtained from the Government, and the quantity now extracted amounts to about 25,000 tons annually.

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